American Foundryman

A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES

Malleable iron plays an important part in the construction of modern trench mortars. See page 5.

National Membership Committee Organized, See Page 2 — A.S.T.M. Specifications Now Available Through A.F.A., See Page 3—Malleable Iron in the Defense Program, See Page 5—Foundry Control Methods-111, See Page 12.

October 1941

Trained Men for Defense

NEVER in American history have demands been made on the production facilities and manufacturing technique of the foundry industry such as the Defense Program of our country requires in the present emergency. While undreamed of records and results are being accomplished, we hear on all sides of the shortage of trained mechanics and executives familiar with our industry.

A.F.A. is answering the call of the industry for "Trained Men for Defense," offering special information to its members on malleable, steel, non-ferrous and gray iron practice, sand research, metallurgy and other related subjects. Members also can participate in the discussions, lectures, and conferences of twenty-one chapters. Leaders in the industry are conducting chapter meetings and contributing valuable information to members.

Are you taking advantage of this opportunity to have your organization get its share of this special training? Are your superintendents, foremen, metallurgists receiving the papers, books, and reports of the A.F.A.? If they are not members of the A.F.A., why not encourage them to join now and get the benefit of this training.

"Trained Men for Defense" can be accomplished in a practical and economical way through membership in A.F.A. Contact your local chapter officers or the National Office and help promote trained men and industry development by enrolling your organization in A.F.A. membership.

Your cooperation will assist A.F.A. in the Defense Program.

B. D. Claffey

B. D. Claffey, National Chairman,
A.F.A. Membership Committee.

B. D. Claffey, manager, gray iron and aluminum division, General Malleable Corp., Waukesha, Wis., is National Chairman, Membership Committee, and also a member of the Association's Board of Directors. Last year he served as co-chairman of the Membership Committee and helped lead the drive that netted the greatest enrollment of new members that the Association has ever had. Mr. Claffey is a staunch supporter of the Wisconsin Chapter and served as secretary, vice president and president. In 1940 he acted as Chairman for the chapter's Third Annual Foundry Conference.

American Foundryman

Contents

October, 1941

Volume 3 **Number 10**

Published by the American Foundrymen's Association, Inc., 222 West Adams St., Chicago, Ill., for the purpose of presenting Association and Chapter activities. Published monthly. Subscription price $1.00 per year. Single copies, 10c.

Entered as second class matter July 22, 1938, at the post office at Chicago, Illinois, under the Act of March 3, 1879.

National Membership Committee Organized

REALIZING the need for continuing the good work carried out last year in the National Membership Drive Contest, President Simpson has appointed a National Membership Committee with A.F.A. Director Ben D. Claffey, General Malleable Corp., Waukesha, Wis., as chairman, and E. W. Horlebein, Gibson & Kirk Co., Baltimore, Md., as vice chairman. Serving on the committee will be all chapter chairmen and chairmen of the local chapter membership committees with additional representation from non-chapter territories.

Attention is called to the editorial by Chairman Claffey, which appears on the inside front cover of this issue of *American Foundryman.* It is especially fitting that Mr. Claffey should head this year's Membership Committee for last year he was president of the Wisconsin chapter, which, by adding 107 new members, won the National Contest for the greatest number of new members. Mr. Horlebein was chairman of the Chesapeake chapter which won third place in the same contest by adding 96 new members. It will be recalled that the Southern California chapter, under the chairmanship of Jas. E. Eppley, Kinney Iron Works, by a strenuous last-minute spurt, won second place with 102 new members.

E. W. Horlebein, Vice Chairman, National Membership Committee

Assisting Chairman Claffey and Vice Chairman Horlebein on the 1941-1942 committee are the following:

J. A. Bowers, chairman, Birmingham District chapter, American Cast Iron Pipe Co., Birmingham, Ala.

A. S. Holberg, chairman, Membership Committee, Birmingham District chapter, Alabama Clay Products Co., Birmingham.

H. B. Harvey, chairman, Central Indiana chapter, Indiana Foundry Corp., Muncie, Ind.

L. E. Davis, chairman, Membership Committee, Central Indiana chapter, Republic Coal & Coke Co., Terre Haute, Ind.

L. D. Wright, chairman, Central New York chapter, U. S. Radiator Corp., Geneva, N. Y.

E. G. White, chairman, Membership Committee, Central New York chapter, Crouse-Hinds Co., Syracuse, N. Y.

R. T. Covington, chairman, Membership Committee, Chesapeake Chapter, American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

L. L. Henkel, chairman, Chicago chapter, Interlake Iron Co., Chicago.

Fred Hintze, chairman, Membership Committee, Chicago chapter, Illinois Clay Products Co., Chicago.

W. M. Ball, Jr., chairman, Cincinnati District chapter, Edna Brass Mfg. Co., Cincinnati, O.

Charles Hilb, chairman, Membership Committee, Cincinnati District chapter, H. Kramer & Co., Cincinnati, O.

V. A. Crosby, chairman, Detroit chapter, Climax Molybdenum Co., Detroit, Mich.

F. A. Melmoth, chairman, Membership Committee, Detroit chapter, Detroit Steel Castings Co., Detroit, Mich.

N. E. Woldman, chairman, Metropolitan chapter, Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J.

D. Polderman, Jr., chairman, Membership Committee, Metropolitan chapter, Whiting Corp., New York, N. Y.

E. C. Bumke, chairman, Michiana chapter, Oliver Farm Equipment Co., South Bend, Ind.

V. C. Bruce, chairman, Membership Committee, Michiana chapter, Buckeye Products Co., Elkhart, Ind.

F. J. Dost, president, Northeastern Ohio chapter, Sterling Foundry Co., Wellington, O.

W. E. Rayel, chairman, Membership Committee, Northeastern Ohio chapter, Werner G. Smith Co., Cleveland, O.

G. K. Minert, chairman, No. Illinois-So. Wisconsin chapter, Gunite Foundries Corp., Rockford.

John Clausen, chairman, Membership Committee, No. Illinois-So. Wisconsin chapter, Greenlee Bros., Rockford, Ill.

E. M. Welch, chairman, Northern California chapter, American Manganese Steel Div., Oakland, California.

Victor P. Beauchamp, chairman, Membership Committee, Northern California chapter, Balfour Guthrie, San Francisco, Calif.

N. B. Clarke, chairman, Ontario chapter, Steel Co. of Canada, Ltd., Hamilton, Ontario.

T. D. Barnes, chairman, Membership Committee, Ontario chapter, Wm. R. Barnes Co., Hamilton, Ontario.

Harry Reitinger, chairman, Philadelphia chapter, U. S. Pipe & Foundry Co., Burlington, N. J.

John H. S. Spencer, chairman, Membership Committee, Philadelphia chapter, H. W. Butterworth & Sons Co., Philadelphia, Pa.

A. H. Putnam, chairman, Quad City chapter, A. H. Putnam Co., Rock Island, Ill.

Chris E. Oberlander, chairman, Membership Committee, Quad City chapter, Moline, Ill.

C. H. Morken, chairman, St. Louis District chapter, Carondelet Foundry Co., St. Louis, Mo.

John Williamson, chairman, Membership Committee, St. Louis District chapter, M. A. Bell Co., St. Louis, Mo.

B. G. Emmett, president, Southern California chapter, Los Angeles Steel Casting Co., Los Angeles, Calif.

G. W. Effinger, chairman, Membership Committee, Southern California chapter, Snyder Foundry Supply Co., Los Angeles, Calif.

E. C. Madson, chairman, Twin City chapter, Andersen Foundry Co., Bayport, Minn.

Robert Wood, Jr., chairman, Membership Committee, Twin City chapter, Minneapolis Electric Steel Casting Co., Minneapolis, Minn.

D. E. Seyferth, chairman, Western Michigan chapter, West Michigan Steel Foundry Co., Muskegon, Mich.

C. J. Lonnee, chairman, Membership Committee, Western Michigan chapter, Muskegon Piston Ring Co., Sparta, Mich.

R. K. Glass, chairman, Western New York chapter, Republic Steel Corp., Buffalo, N. Y.

James L. Yates, chairman, Membership Committee, Western New York chapter, Worthington Pump & Machinery Corp., Buffalo, N. Y.

A. C. Ziebell, president, Wisconsin chapter, Universal Foundry Co., Oshkosh, Wis.

W. A. Hambley, chairman, Membership Committee, Wisconsin chapter, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

James C. Burt, Burt Foundry Co., Toledo, O.

H. W. DeBruin, Jeffrey Manufacturing Co., Columbus, O.

Rufus Harrington, Hunt-Spiller Manufacturing Co., Boston, Mass.

Thos. Kaveny, Sr., Herman Pneumatic Machine Co., Pittsburgh, Pa.

A. O. Nilles, Griffin Wheel Co., Kansas City, Kan.

H. S. Washburn, Plainville Casting Co., Plainville, Connecticut.

Thos. H. Shartle, Texas Electric Steel Casting Co., Houston, Texas.

A.S.T.M. Castings Specifications Now Available Through A.F.A.

AT A RECENT MEETING of the Technical Activities Correlation Committee of the American Foundrymen's Association, that committee voted unanimously to strengthen the cooperation between A.F.A. and A.S.T.M. on specification matters for castings and to aid A.S.T.M. in its endeavors to promote the use of its specifications throughout the castings industry. A.F.A. is one of the charter members of A.S.T.M. and since 1922 has recognized A.S.T.M. as the specifications making body of the castings industry.

Many A.F.A. members are serving on A.S.T.M. committees and your Association has official representation on all committees of interest to the castings industry. A.F.A. representations on A.S.T.M. committees and subcommittees were shown in the 1941-42 Committee Personnel published in the September issue of *American Foundryman.*

To encourage the use of A.S.T.M. specifications, that organization was approached and approved the sale of its specifications to the foundry industry through the A.F.A. On the back cover page of this issue you will find a list of A.S.T.M. specifications applying to the castings industry. These may be purchased through the national office of your Association, 222 West Adams Street, Chicago, at the same price that they are obtainable through A.S.T.M. This inaugurates a new service to you as an A.F.A. member.

Specifications for Gray Iron Castings

By W. H. Spencer,* Birmingham, Ala.

THE present national emergency, with its flood of defense orders, necessitates vastly increased production in the gray iron industry. Since the first aim in most foundries is to increase production without plant expansion, systematic planning of work schedules is necessary. Anything that tends to disrupt the flow of production is disastrous to schedules.

One frequent cause of confusion and delay in getting out work is the present condition of specifications for gray iron castings. Specifications are issued by various societies, agencies, institutes, boards, producers, engineers, and individual purchasing agents. The physical properties specified for the iron and the testing methods prescribed vary in the different specifications for similar applications of the material. In addition, it is not always convenient to obtain some of the specifications.

Due largely to the existing conditions, the foundrymen see only the bad features of the situation and do not see the value of specifications. Naturally, they develop an antagonism toward all specifications, deciding that they do not mean much and are only a nuisance anyway.

It is comparatively easy to offer destructive criticism, but we will now pass to some suggestions which we hope will be constructive.

Unification and simplification of specifications for cast iron would solve the problem. The American Society for Testing Materials has taken the first step in this direction by adopting specification A 48-36. This is the first general specification for cast iron for all applications. Since the A.S.T.M. committee is made up of members from both producer and consumer groups, the

*Thomas Foundries, Inc., Chairman A.F.A. Gray Iron Division, and Division's Representative on A.S.T.M. Committee A-3, Iron Castings.

specification issued by them is equitable and authoritive.

Some work has already been done in having A 48-36 accepted as the basis for specifications issued by other groups and individuals. The Gray Iron Division Committee of the American Foundrymen's Association is working on a plan for co-operation with the A.S.T.M. in further unification and simplification of cast iron standard specifications.

If it is necessary for users of certain kinds of castings (such as pipe, car wheels, etc.) to have additional physical properties specified, these may be added to those covered by A 48-36. The same applies to users of alloy cast iron, in which case the alloy content may be specified.

One general specification for gray iron castings can only be achieved by the whole-hearted co-operation of the gray iron foundrymen in a campaign to secure acceptance of such a specification by all purchasers. At the same time, we will be promoting the use of cast iron as a reliable engineering material.

Malleable Specifications

By H. A. Schwartz,* Cleveland, O.

THERE seems to be general acceptance of the current A.S.T.M. malleable specifications as standard by all interested parties. At any rate, the physical properties therein set out seem to contribute the backbone of the great majority of specifications, even where individual consumers add peculiarities of their own.

The greater part of malleable tonnage of the United States finds ready acceptance under Specification 32150 constituting the weaker or more machinable grade of malleable covered by the A.S.T.M. It is unlikely that even the requirements for that grade exceed what is necessary for the satisfactory performance of most services. Under the circumstances, there seems little ground for confusion or for any particular activity in connection with the current specifications for this product.

*Manager of Research, National Malleable & Steel Castings Co., and A.F.A. Malleable Division Representative, A.S.T.M. Committee A-7, Malleable Iron Castings.

Greater Attention to Safety Measures

THE A.F.A. has received a communication from the National Safety Council to support a nation wide campaign of safety as a defense measure. The Safety Council has asked this support as a result of a proclamation of the President of the United States calling upon the Council to mobilize its nation wide resources in leading a concerted and intensified campaign against accidents, preventing wastage of human and material resources of the nation through accidents.

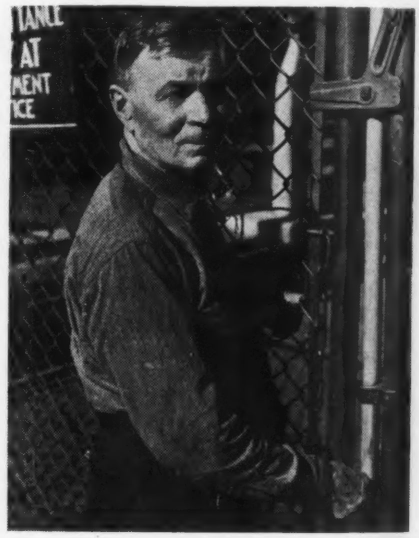
In response to this appeal President Simpson has assured the National Safety Council of the backing of the A.F.A. in this movement. The Association has, through its committee on safety and hygiene, been carrying on over the years a definite program of promoting interest in this subject, which involves primarily interesting foundry executives in good housekeeping, a fundamental safety measure. Foundry executives are urged to give even greater attention to safety measures than in the past for it is realized that with the increasing number of new employees that the tendency is for accidents to show a decided increase. With the new employees a definite program of safety education is needed.

An excellent report on the education of new employees in safety measures is the publication "Conserving Men, Money and Materials in Essential Industries," a discussion check list for industrial executives concerned with emergency production. Copies of the report may be obtained in addressing the Policy Holders Service Bureau, Metropolitan Life Insurance Co., No. 1 Madison Ave., New York City.

Completes Fifty Years of Service

FRANK HADY, an employee of Belle City Malleable Iron Co., Racine, Wis., last month completed his 50th year of service with that company. Mr. Hady has had an enviable record. During his entire service, he has never been sick a day nor been away from work because of illness. Company doctors say he is still A-1 physically.

For 46 years, Mr. Hady worked as a molder. However, company officials, realizing that he was not the type to ask for lighter work because of his advancing years, gave him the job of watchman, which in these days of defense production is a mighty important job. Mr. Hady began his career with the Belle City Malleable Iron Co. at the age of 18.



Frank Hady

He came to Racine from Watertown, Wis., his birthplace, and remained there ever since.

When asked whether or not he would advise a young man to learn the foundry trade, he said, "Certainly. It's not as tough as it may appear. Just stick with it for a while and you'll never want any other kind of work. It sorta gets in your blood." Mr. Hady practices what he preaches for his son Erving, who is 30 years old, is also employed at Belle City and is on his way to beat his dad's record.

Mr. Hady was signally honored by his company, when he passed his 40th year of service, by the presentation of a gold watch. When his 45th year rolled around, he was given a diamond studded pin. He is president of the company's "25-year club" of veteran employees.

Malleable Iron in the Defense Program

By James H. Lansing,* Cleveland, Ohio

HENRY FORD recently said that the use of castings saves both time and tools. Never, in our time, has such a saving been of greater importance. In the present emergency, we are called on to equip others at the same time that we are arming ourselves. And the nature of armament has so changed, with the advent of major scale mechanization, that the most effective use of machine tools and man hours has become of paramount importance in the Defense Program.

Fortunately, automotive manufacturers have long known that in malleable iron castings they have available a tough material which will withstand the shocks and strains of severe military service. This material may be

*Shop Practice Engineer, Malleable Founders' Society.
NOTE: This paper was presented at a session on Malleable Founding at the 45th A.F.A. Convention, New York City, May 13, 1941.

Fig. 1—Malleable Iron Solves the Army's Transportation Problems in These Cars and Trucks. 1—Heavy Army Truck. 2—Midget Reconnaissance-Combat Cars Advancing. 3—Aviation Gasoline Truck. 4—Heavy Six-Wheel Truck Where Going Is Tough. 5—Armored Half-Trac Scout Car. 6—Four-Wheel Drive Armored Scout Car. 7—Front of Four-Wheel Drive Armored Army Scout Car.

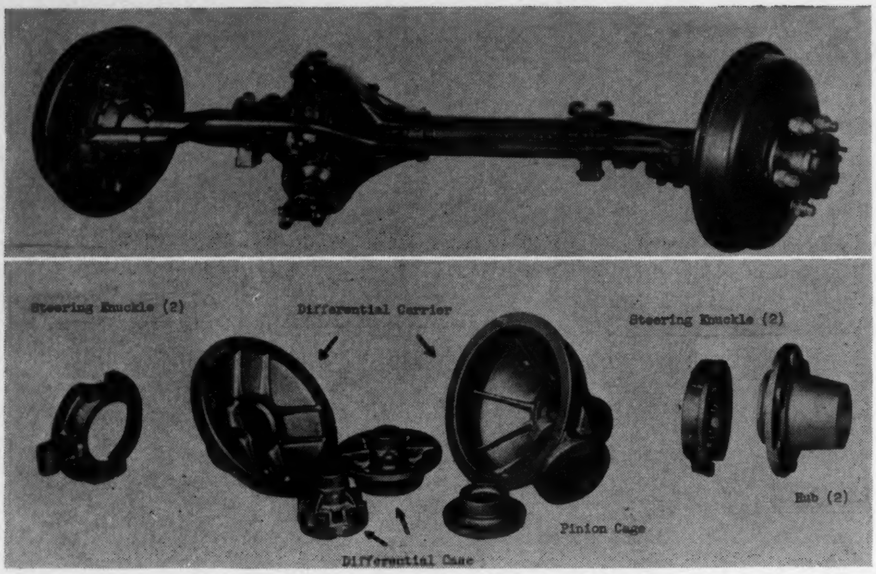


Fig. 2—Malleable Castings Used in Armored Army Scout Cars.

cast in practically any required section and patterns so designed that a minimum of machining will be required. Furthermore, the required machine work may be performed with greater speed and ease than in the case of any material of comparable physical properties.

So, realizing the saving in time and tools afforded by this tough material, automotive engineers, in collaboration with military engineers, have been quick to utilize malleable iron castings not only where they have given stout service in the past but also in additional applications necessitated by military requirements.

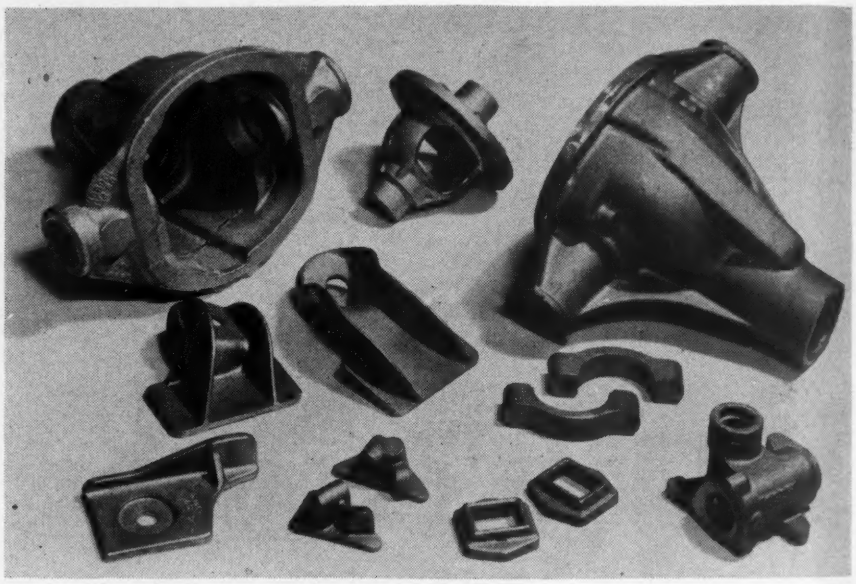
Scout Cars

A case in point is the four-wheel drive armored scout car shown as No. 6 in Fig. 1. On both it and the "Half-Trac," No. 5, Fig. 1, driving front wheels are required. So a sturdy front driving axle assembly has been developed in which malleable iron is used in differential carriers and cases, in pinion cage, steering knuckles and hubs. A total of 315 lb. of malleable iron castings is thus used in the front axle of each four-wheel drive and half-trac armored scout car. In addition, on the four-wheel drive car, in such places as the rear axle assembly, the steering gear assembly, etc., 448 additional lb. of malleable are used, bringing the total per car to 763 lb. Some castings used in scout cars are shown in Fig. 2.

Midget Reconnaissance-Combat Cars

Also for our fighting forces, a light small and mobile vehicle is required. Such is afforded in the quarter-ton "Midget Reconnaissance-Combat Car." It scouts out the enemy, rushes up advance units and darts back for additional personnel and weapons. These cars do not hesitate to leave roads and strike across country, so must also have forward, as well as rear, driving wheels. Figure 1, No. 2, shows a column of these cars in an advance.

Due to the ability of these midget cars to carry three men and tow an anti-tank gun, it is hoped that they will furnish the



Top—Fig. 3—A Number of Malleable Iron Parts Used in Midget Reconnaissance Cars.

Bottom—Fig. 4—Machining an Army Truck Differential Case.

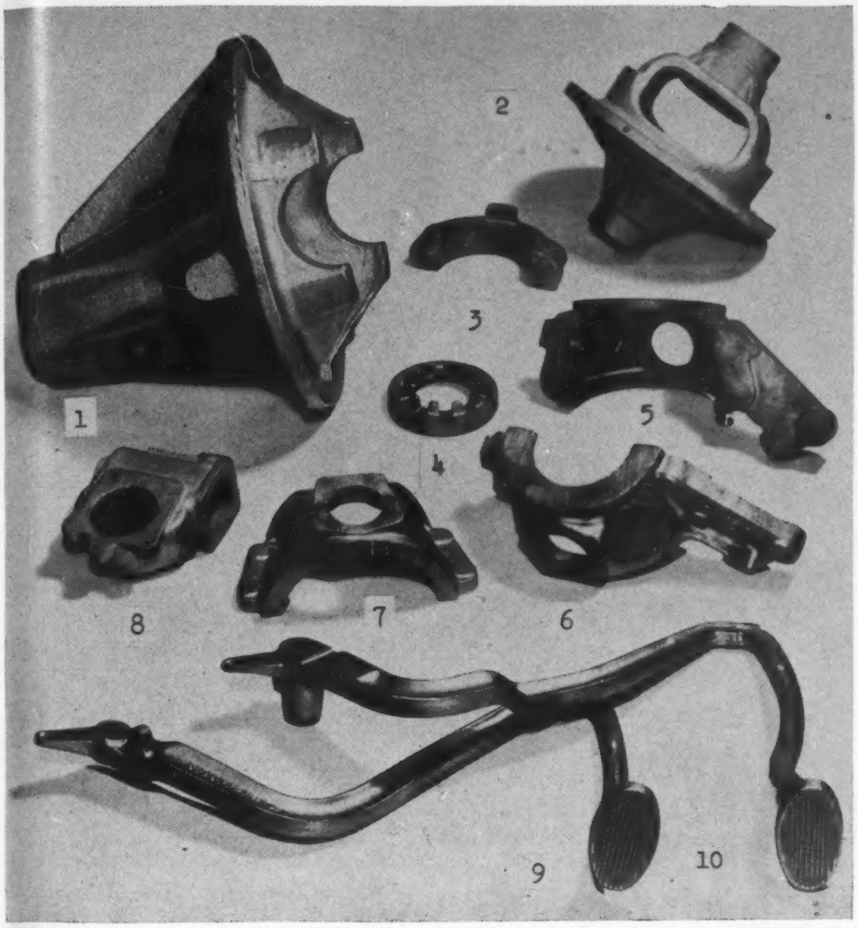


Fig. 5—Malleable Castings Used in Truck Shown at No. 1 in Fig. 1. Castings Shown Include: 1—Differential Carrier; 2—Differential Case; 3—Bearing Cap; 4—Adjusting Ring; 5—Steering Knuckle Bracket (Right); 6—Steering Knuckle Bracket (Left); 7—Steering Knuckle Flange; 8—Steering Gear Case; 9—Clutch Pedal; 10—Brake Pedal.

mobile anti-tank defense for which the allies have been searching. In the Balkans, as well as in Holland, anti-tank guns were scattered along the extended defense lines, as no one knew where the tanks would strike. Their effectiveness was thus greatly reduced. However, with midget cars to rapidly swarm up with the guns, while affording a poor target in themselves, it is hoped that much of the answer to the tank blitz may be at hand. In the construction of these cars the front axle differential assembly is housed and supported by a malleable iron carrier which contains a differential case and two bearing caps also of malleable iron. A similar assembly is in the rear axle, and other malleable parts, including the steering gear housing, windshield brackets and spring bumper mountings, are likewise used to advantage. (Fig. 3.)

Army Trucks

Not only in the reconnaissance-combat cars but also in the army trucks do malleable iron castings go into service. The army needs many thousands of

army trucks do malleable iron castings go into service. The army needs many thousands of these trucks and needs them in a hurry. Already thousands similar to the one shown as No. 1 in Fig. 1 have been built and more are in process.

In Fig. 1, illustration No. 1, the truck is "ploughing through" where the going is tough. Again a four-wheel drive is used and again tough malleable iron castings play their part in both front and rear axle differential assemblies. Figure 5 shows, individually, steering mechanism and brake and clutch control parts.

Illustrative of the facility with which malleable iron machines, is the operation on the steering gear case. The core is drilled, counterbored and the cover face is faced in a combined operation at speeds up to 146 ft. No special tools are used, just standard high speed steel. Figure 4 shows an army truck differential case being machined on an automatic chucking tool. The ring diameter is faced and turned, the open end bored and threaded, and the side gear diameter counterbored and faced. Speed is 537 surface ft. on the large diameter.

Six Wheel Drives

For transportation of heavy equipment and munitions, the

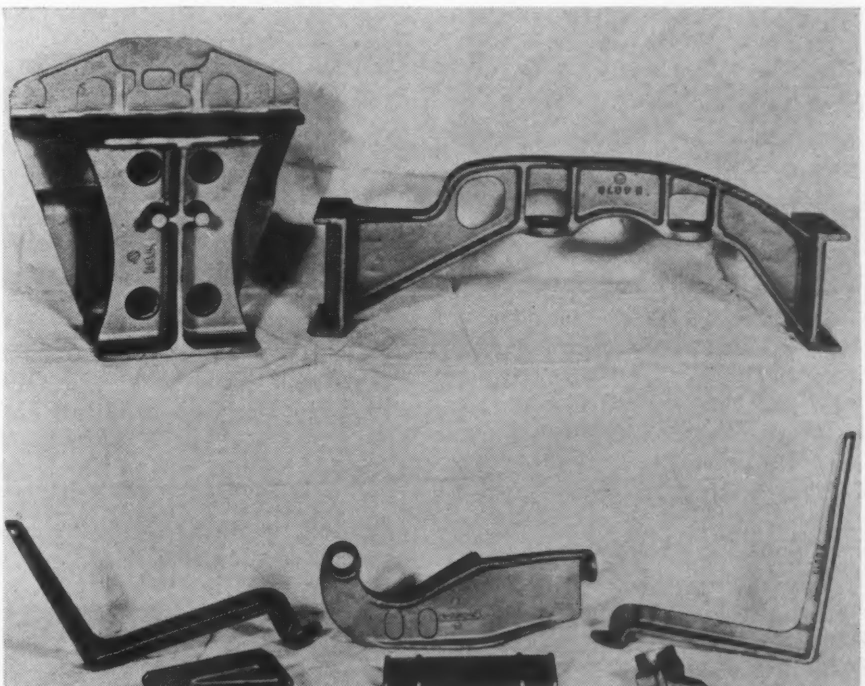


Fig. 6—Malleable Castings Used in Construction of Six-Wheel Drive Truck.

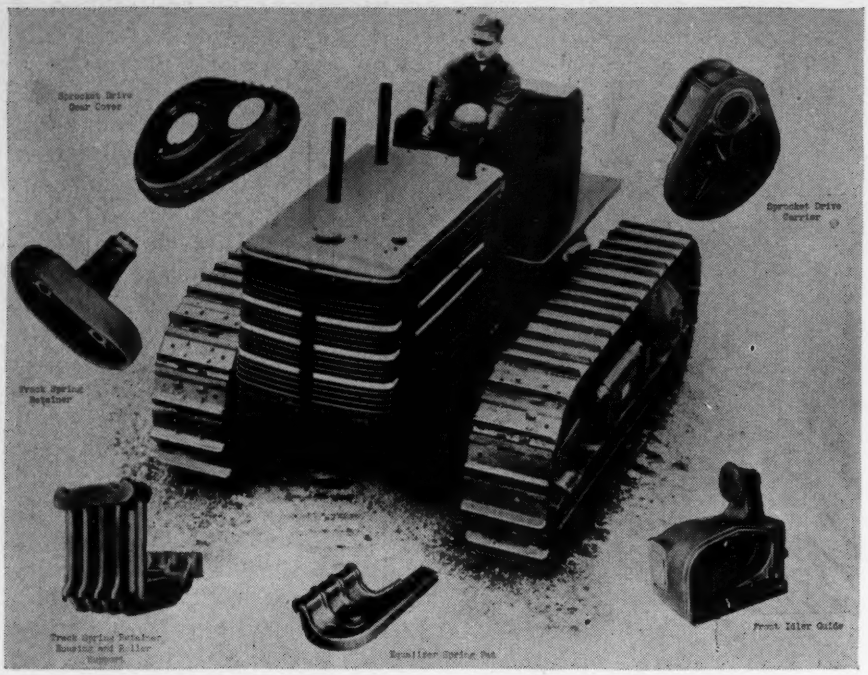


Fig. 7—Army Tractor and Some of the Malleable Castings It Contains.

army requires a giant truck with six driving wheels. It must be able to climb grades 40 to 50 degrees and operate across territory that the average vehicle simply could not negotiate at all. Figure 1, No. 4, shows one which is ploughing through the mud. Again malleable iron castings are used in many locations, notably the large tandem unit frame bracket and the front engine support crossmember. Also illustrated are spring hangers and spacers as well as fender, frame, and transmission case brackets. (Fig. 6.)

Army Tractors

Army engineers well appreciate the value of the crawler type tractor where there is heavy work to be done and the traction is poor. Operating under the most adverse conditions, the tractor is subject to abuse similar to that encountered by the army tank.

Many tough malleables go into tractor construction. Big massive castings (Fig. 7) are required, the individual weight of some running to several hundred pounds. Notable among the malleable castings used are the front idler guide, the track spring and equalizer spring guide, the sprocket drive carrier, the equalizer spring pad, the sprocket drive gear cover and the track spring retainer. These constitute an important tonnage going into Defense Production.

Again toughness and ease of machining recommend malleable iron use. In machining the gear cover, a 3-spindle horizontal milling machine is used with the two lead spindles taking the rough cut and the single large cutter taking the finish cut. On the rough cut the feed is 12-in. The speed of the 17-in. cutters is 20 r.p.m. and the depth of cut from ⅛ to ¼-in. The finish cut feed is 14-in., the speed 20 r.p.m. and the cutter diameter 34-in., with a 1/64-in. depth of cut.

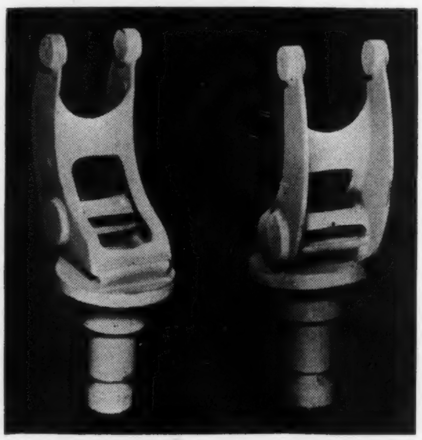


Fig. 8—Machine Gun Mountings.

Machine Gun Mountings

In machine gun mountings, malleable iron castings again serve (Fig. 8). These rapid fire pieces must be sturdily and yet flexibly supported. Whether for scout car or tank mounting or for tripod use, a malleable iron pintle cradles the gun so that it may be easily and rapidly played in any direction. Here, as in many other applications, the corrosion resistance of the material is a valuable asset in addition to its toughness and ease of machining.

Army Field Ranges

The "Rolling Kitchen" of the first World War was a step toward mechanization. It has now given way, however, to the neat, compact army field range (Fig. 9). Three of these units are loaded on a truck and do an efficient job in the commissary department.

In the construction of the field ranges, many small malleable iron castings are used to excellent advantage (Fig. 10). They are rapidly and easily machined but at the same time furnish the toughness necessary in "service" equipment.

Aviation Gasoline Supply Trucks

Airplanes are of universally recognized importance in the Defense Program. To enable them to function effectively, supplies of aviation gasoline must be on the required spot. Streamlined and easily maneuvered aviation supply trucks efficiently deliver the "gas" with minimum loss of time and motion. Contributing to the rug-

Fig. 9—Army Field Range.

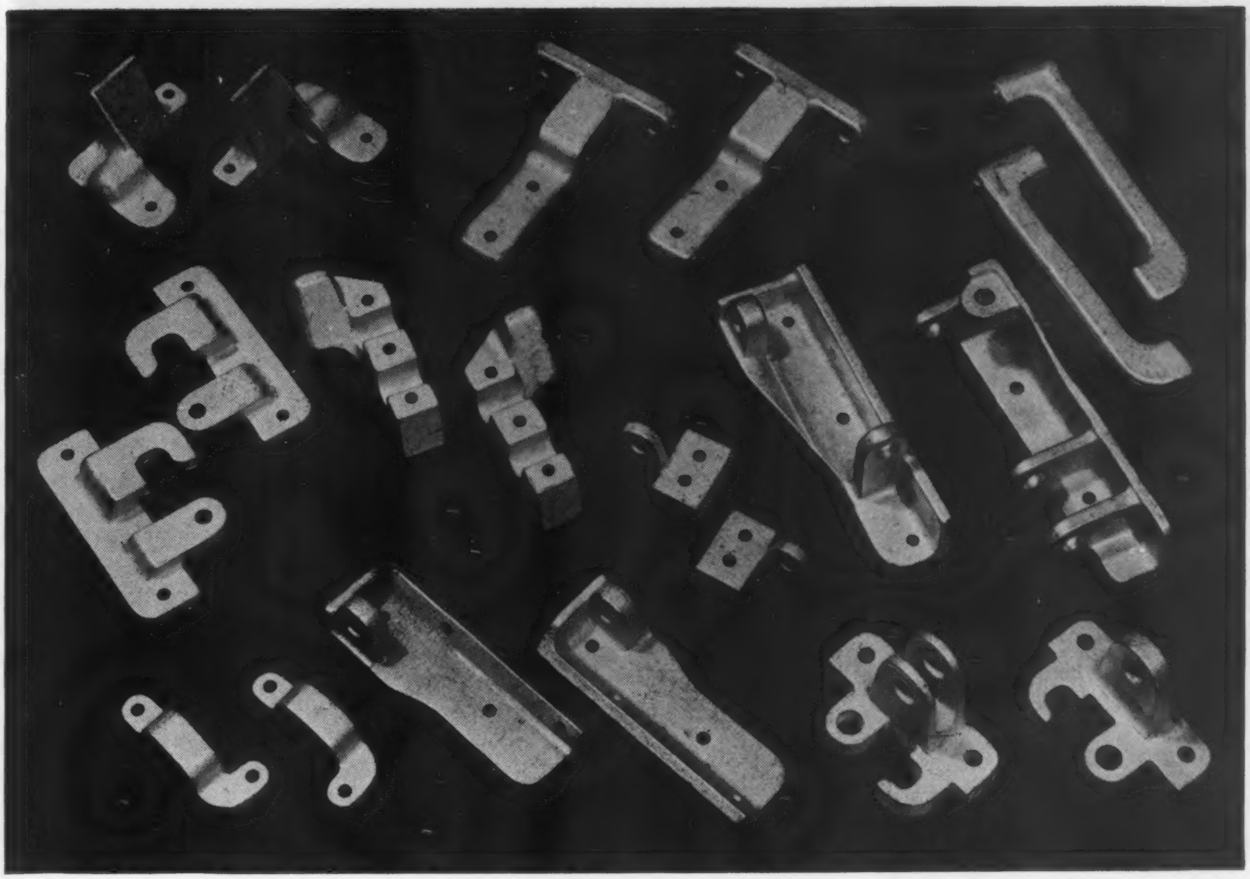


Fig. 10—Some Malleable Castings Used in Construction of Army Field Range.

gedness of these trucks and helping to speed their construction are many malleable iron castings. Among those illustrated in Fig. 11 are: Front and rear spring brackets, spring seats and clamps, radius rods, and brake support and control parts.

Airplane Tail Wheel Assembly

Figure 12 shows some light airplane tail wheel brackets made of alloy malleable iron. Thus far their use has been on light training ships.

60 and 81 Millimeter Mortars

In present day combat, the limited range hand grenade of the first World War has largely given way to the 60 and 81 milli-

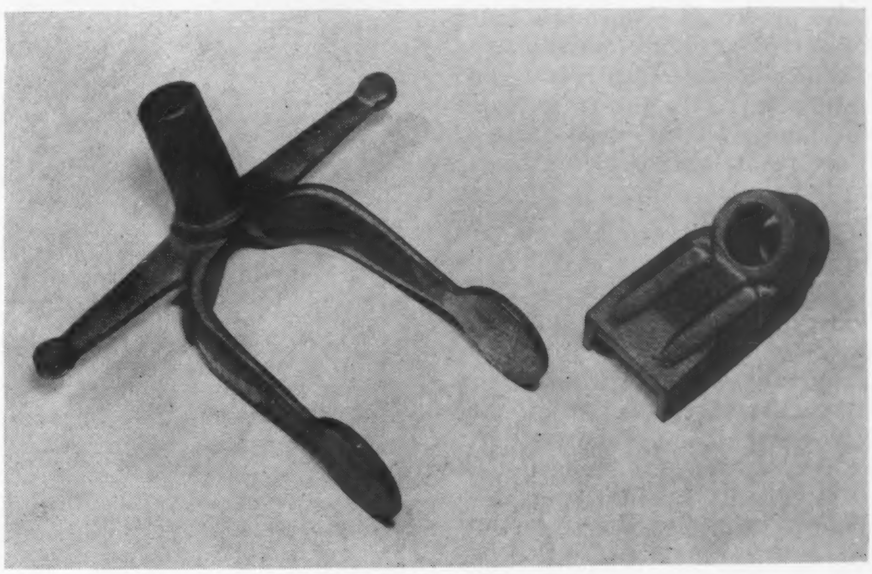


Fig. 12—Airplane Tail-Wheel Brackets.

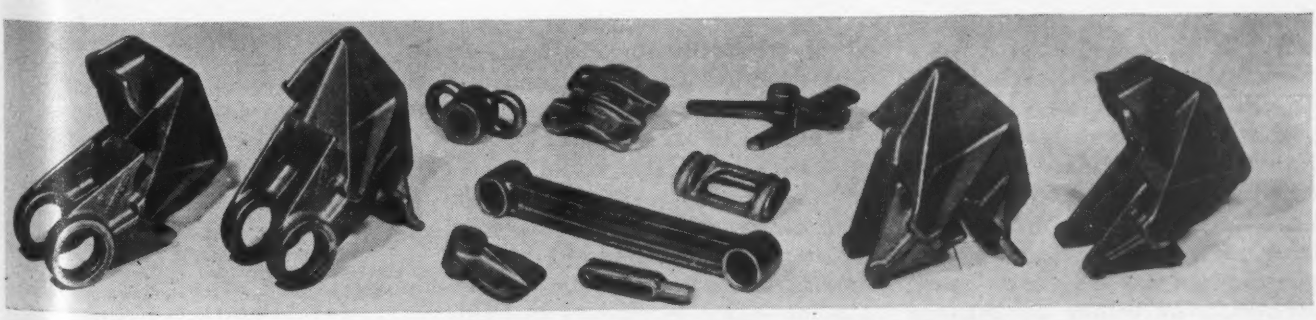


Fig. 11—Many Parts of the Army's Aviation Gasoline Trucks Are Malleable Iron.

Fig. 13—Malleable Castings Used in Mortar Construction.

meter mortar. These weapons, of which many thousands are being manufactured, can lob their bomb-like projectiles into otherwise protected positions a scant hundred yards off—or send them soaring to an objective a good mile away. On the front cover is shown one of these guns of the 60 mm. variety.

Because of the strain and shock of fast fire the modern mortar must be strong. It is exposed to the elements, so it must be corrosion-resistant. It is bound to get rough treatment, so it must be tough. Because it has all these qualities, malleable iron was chosen for the mortar parts shown in Fig. 13. And because it is so easily machined, enabling faster production and the use of fewer machine tools, malleable iron is contributing much to the speed of the nation's defense work.

Further Use of Malleables in 75 mm. Guns and 60 mm. Mortars

Gun support castings (Fig. 14) for the 75 mm. piece and gear case castings for the 60 mm. mortar have been made in malleable iron and submitted to the government for service tests. Adoption of either or both of these parts will speed defense

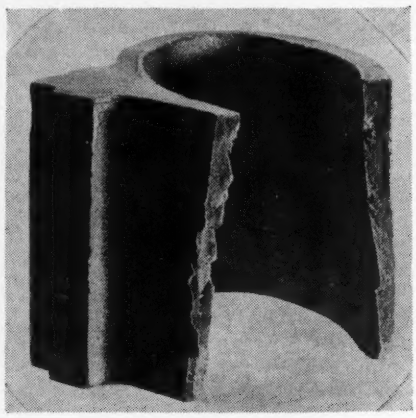


Fig. 14—75 mm. Gun Support (Intentionally Broken in Test).

production. This is especially true in the case of the mortar gear case which is being machined from a solid forging. As indicated in Fig. 15, much metal and machine work is saved when the part is made in a malleable iron casting.

Thus well illustrated is the important contribution of malleable iron castings to National Defense. In reconnaissance-combat cars, both large and small, in trucks from the ¾-ton up to the big six-wheel drive, in tractors, machine gun mountings and in mortars, malleable iron serves. It not only does its part, but aids greatly in relieving the machine tool and man hour bottle necks. Equipment using malleable will be ready *on time.*

Help! Help! On Sintering Test

CHAIRMAN J. B. CAINE, Sawbrook Steel Castings Co., Lockland, Ohio, of the Foundry Sand Research Subcommittee on Sintering Test, has requested that we ask those members of the Association who are equipped with sintering test apparatus to contact him. Chairman Caine is very desirous of having as many as possible try out the new sintering test method which has been evolved by his subcommittee. He wishes to ascertain whether or not duplicate results can be obtained by the new method in various laboratories. Any help members can give to Chairman Caine at the above address will be sincerely appreciated.

National Standards Group Approves A. F. A. Code

THE American Standards Association has approved "The Tentative Code of Recommended Practices for Grinding, Polishing and Buffing Equipment," as developed by the A.F.A. Committee on Safety and Hygiene. James R. Allan, International Harvester Co., Chicago, chairman of the A.F.A. Committee, has for several years served as the A.F.A. representative on the American Standards Association Committee Z-9, on Safety Code for Exhaust Systems.

Fig. 15—Mortar Gear Case (Intentionally Broken in Test).

Thirty Complete Foundry Defense Training Course at Minnesota

ON September 2, 30 men received certificates from the University of Minnesota indicating that they had successfully completed one of the first Government Defense Training Courses in *Foundry Control and Casting Inspection.* These men, although many of them are working full time in industry, had attended the University three hours each night, five nights each week for 24 weeks. Besides the 360 hours these men had worked in the University laboratories and lecture rooms, they were required to study 120 hours on outside assignments.

The objective of this course was to train a number of select two year college men to be foundry control technicians and casting inspectors. The United States Office of Education, realizing that the rigid specifications in defense contracts for foundry products are creating an urgent demand for foundry technicians and inspectors, appropriated over $6,000.00 to train these men.

Lectures given by a number of University faculty members covered such fields as general foundry practice, sand testing and control, melting operations and control, physical material testing, chemical analysis of raw material and finished product, pyrometry control, X-ray inspection of castings, macro and micro-inspection, casting defects and causes.

A close correlation was maintained between the theory discussed in lectures and the actual laboratory work. Typical problems, such as found in the foundry industry, were studied and solved. Such problems involved studying raw materials, molding processes, gating systems, calculation of furnace charges, operation of the furnaces under very strict control, physical and chemical analysis of the finished product and a complete report as to the causes of any defective castings. The equipment used by these students in the laboratory was of the latest design and laboratory projects included a study of the operation and calibration of this equipment. The course material covered in this comprehensive 24 week period was equivalent to one year of college education.

The foundry industry should feel fortunate that the Government has foreseen the shortage of college trained control technicians and casting inspectors and has taken steps to train men to relieve this problem. The University of Minnesota, as well as the Government, is now awaiting with interest to see how rapidly these men are absorbed in the industry, as similar courses are being planned for the fall.

Birmingham Chapter Announces Educational Course

THE educational course for the apprentices and other young foundrymen of the district sponsored last year by the Birmingham District chapter under a committee headed by Lynn Ogden, Stockham Pipe Fittings Co., was so successful and filled such an evident need, that the chapter announces this will be repeated this coming fall. T. H. Benners, Jr., T. H. Benners & Co., has been appointed to head this work by Chapter Chairman Jim Bowers, American Cast Iron Pipe Co. Working with Mr. Benners will be: Howard Nelson, Hill & Griffith Co.; W. J. Meriwether, American Cast Iron Pipe Co.; J. L. Franklin, Central Foundry Co.; Wm. Bird, Alabama Pipe Co.; R. L. Ogden, Stockham Pipe Fittings Co.; T. S. Whittet, National Cast Iron Pipe Co.; W. Lee Roueche, Sr., McWane Cast Iron Pipe Co.; Gordon Jones, U. S. Cast Iron Pipe & Foundry Co.; and W. E. Curran, Republic Steel Corp.

Thirteen sessions have been planned, to run from October through April, with two meetings each month. The first two will be held Oct. 10 and Oct. 24. The course will cover dry sand core work, cupola operation and similar subjects.

Several of the other chapters, which have conducted such courses, in addition to their regular chapter meetings, have also found them so valuable that they will continue them this year. Donald S. Lane, Bethlehem Steel Co., Sparrows Point, Md., will be chairman for the Chesapeake chapter course; L. F. Lottier, Peoples Gas, Light & Coke Co., chairman of the Chicago chapter course; and R. G. McElwee, Vanadium Corp. of America, chairman of the Detroit chapter course. Details of these and other chapter educational courses will be reported later.

U. S. Engineering Defense Training Programs Seek Help of Foundrymen

WORD from Fred G. Sefing, International Nickel Co., New York, chairman of the A.F.A. Committee on Co-operation with Engineering Schools, indicates his committee is being called upon to assist in the program of Engineering Defense Training courses promoted by the U. S. Office of Education, Federal Security Agency. Mr. Sefing has worked personally with Rutgers and New York Universities. The University of Illinois is planning Foundry Sand Control courses under the supervision of its extension division to be held in foundry centers of central and western Illinois. The University of California is sponsoring a course on "Metallurgical Aspects of Iron and Steel Founding," with Thomas J. Adams, metallurgist, Columbia Steel Co., Pittsburgh, Calif., acting as instructor who plans to use the A.F.A. *Cast Metals Handbook* as a text. Other training courses along these lines of special foundry interest are being developed and will be reported in the *American Foundryman.*

Foundry Control Methods In Making Uniform Cast Iron—III

By E. K. Smith, Detroit, Mich.

This is the third and concluding installment of this paper, the two preceding installments being published in the August and September American Foundryman. This, the third section, presents data on physical tests and test bars, which includes the dumbbell test, fluidity test, impact test and the repeated test. A discussion on shrink control and wedge test bars, used for shrinkage control, is given. In conclusion the author offers other variables that can cause un-uniform castings. The Southern and Northern California Chapters had this paper presented at their Regional Conference, May 22, by the author, who is metallurgist, Electro Metallurgical Co., Detroit, Mich., during the Western Metals Congress.

Physical Tests and Test Bars

THE old time test of breaking a casting or test bar with a hammer and observing the fracture still has lots of advantages. An experienced foundryman can get a pretty good idea of strength, grain size, machinability and other properties by this simple test.

A.S.T.M. specification A 48-36 for regular control of physical properties is in wide use. This gives tensile strength as standard, and transverse strength and deflection as optional. The specification covers different classes with tensile strengths running from 20,000 up to 60,000 lb. per sq. in. and gives complete information on test bars. One important point in this specification is that while physical properties are dealt with in detail, no chemical analyses are specified.

Dumbbell Test

One disadvantage of the standard specification mentioned above is that the tensile test bar must be machined. Under ordinary conditions, this is not a large factor, but where a large number of test bars are to be cast for uniformity control purposes, the expense and delay involved may be a detriment, particularly in these days when machine shop capacity is of greatest imporance. This principle was recognized years ago by a number of foundries making pipe fittings. As most of these foundries maintain warehouses throughout the country, it would be very difficult to tell the exact physical properties of all their warehouse castings. However, a certificate of quality is often required by users of gray iron fittings, as a failure might be disastrous. Therefore, the fittings manufacturers arranged to pour a special test bar at frequent intervals, so that a certificate could be issued if necessary to the consumer, to the effect that all the castings were poured with iron which met this specification. This specification, No. A-126-30, was adopted by the A.S.T.M. and Fig. 9 illustrates the tensile and transverse bar.

According to the specification, the dumbbell bar is threaded on the ends and then is pulled with the central portion "as cast." This involves threading the end of the bars. In order to expedite the tensile test still more, a large number of the dumbbell bars without any machining were pulled just "as cast," in self-centering jaws, and at the same time standard test bars machined out of the transverse bar poured in the same mold were pulled. It was found that the tensile strength as shown in the standard machined bar and the unmachined dumbbell bar was substantially the same. The writer feels that the so-called dumbbell bar offers the average foundryman a very good method of promoting uniformity in the physical properties of his castings without any machining cost. It may be mentioned that this dumbbell bar with the machined ends is being used by a number of large producers of gray iron fittings, and its use is stated to give very close control of the product.

Fluidity tests are being used in increasing numbers of foundries for uniformity control, as well as for the prevention of cold run castings. Fluidity in general depends on the temperature of the iron and on the chemical analyses, particularly carbon. There are a number of contributing factors. The fluidity test bar described by Saeger and Krynitsky[9], A.F.A. *Transactions,* has been very widely used. Zeigler and Northrup[10] go into

Fig. 9—Mold of tensile and transverse test specimens.

this matter in detail in their A.F.A. paper. Modifications of the fluidity spiral, which offer a quick and inexpensive way of checking fluidity, are in use in a number of production foundries today. One of these castings is shown in Fig. 10. The entire spiral is made in a dry sand core, which is cupped on top to form a pouring basin. A steel rod is held in the opening in the pouring basin until it is full of iron. Then, the rod is at once withdrawn and the iron flows through the spiral as far as its fluidity permits. The fluidity tests are decidedly valuable in uniformity control, as a change in the characteristics of the iron or in the cupola operation is often accompanied by change in fluidity and will show up in these tests.

Impact tests are being used in routine control in some of the larger foundries. Two different impact tests have been developed which promise to be of use in the industry. One is known as the repeated impact, such as was reported in the A.S.T.M. *Transactions*[11]. (The repeated test consists of dropping a weight on the cast iron test bar, the weight being raised higher every time until final fracture.) Another test which is finding increased use is described by M. J. Gregory[12] in *The Foundry*. This test was developed at the Caterpillar Tractor Co., Peoria, Ill. It consists in grinding part of the standard arbitration bar in a centerless grinder to 1.125-in., then breaking it in the Charpy machine with a 6-in. span. The standard Charpy and Izod tests show very little about the impact resistance of cast iron, as the small test bar does not offer a measurable resistance. The figures obtained by the Caterpillar method are high enough to give a real indication of impact values of different types of cast iron. This test is particularly important in types of equipment which are subject to impact in service.

Shrink Control

It has been said many times, that there is no use in making good iron, if the castings are not sound. Probably the worst cause of unsoundness is the familiar "shrink" cavity, which is a porous spot, or actual hole, left in the last part of the casting to solidify. The porosity is usually at the center of a heavy section, or under a riser, or near the junction of a light and heavy section. All kinds of iron shrink in solidifying, and the amount of this shrinkage depends on many factors, such as the composition of the iron, pouring temperatures and pouring time. With any iron of given shrinkage capacity, the tendency to form voids in a casting may also be affected by any number of other variables, such as the type of gates and risers used, type of pig iron, oxidized scrap in

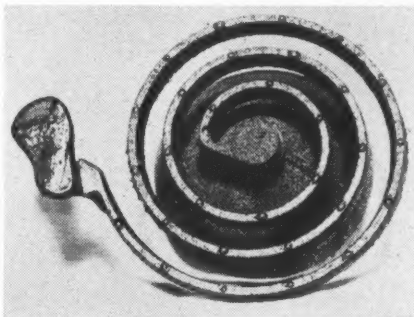


Fig. 10—The fluidity spiral used as a valuable test for metal uniformity.

charge, condition of molding sand, and the weather. Much has been written on this subject recently. W. B. McFerrin[13] gives some interesting observations in A.F.A. *Transactions* based on foundry research. He finds that high carbon plus high silicon, or high carbon plus high phosphorus, are the worst offenders. He finds that results are generally satisfactory when the carbon equivalent is from 3.80 to 4.20 per cent. Carbon equivalent equals total carbon plus 0.3 (silicon plus phosphorus). (See J. T. MacKenzie[14], *Pig Iron Rough Notes.)*

"Shrinks" have given the foundrymen untold difficulty, but each casting has been a separate problem, and has been solved by the individual foundryman one way or another. Comparatively little has been published on testing iron for its shrinking capacity. Some tests have been devised, but not widely used. The familiar "K" bar has been used by some foundries, but results have been hard to correlate. Recently there has been a good deal of basic work on this important subject, and some excellent tests for shrinkage capacity have been devised, some of these having been published. For example, the British use shrinkage "spheres" (W. West and C. C. Hodgson,[15] *Foundry Trade Journal)*. M. A. Scott[16] in the A.F.A. *Transactions* uses a 6x6x10-in. solid block casting to indicate shrinkage.

Shrinkage Not Constant

One of the greatest problems in connection with shrinkage has been due to its not being constant. For instance, a new casting may give trouble due to a shrink cavity. By experimenting with gates and risers, pouring times and temperatures, the cavity is eliminated, and everything goes well for days, or weeks. Suddenly, the shrink cavity appears again, in aggravated form. Apparently, nothing has been changed, but the castings are scrapped. The change in the iron has not been detected by any of the ordinary foundry control methods and defective castings may be made until some are machined and the cavity appears.

All this brings up the need for an inexpensive, quick test for shrinkage capacity of the iron, so that changes can be detected before castings are scrapped. One modification of such test bar, which shows promise for many kinds of control work, is shown in Fig. 11.

Wedge Test Bars

This test consists of a simple wedge, cast in open-top mold. The wedge is 7-in. long, the top being about 2-in. square, tapering to a knife edge at bottom. The wedge at right of Fig. 11 was poured with a type of iron which has little tendency to form cavities. Note that only the top is sunk in. Wedge at left in Fig. 11 was poured with iron which has a moderately strong tendency to form cavities. Note that besides porous spots in center, both sides are cupped in at top. This simple wedge

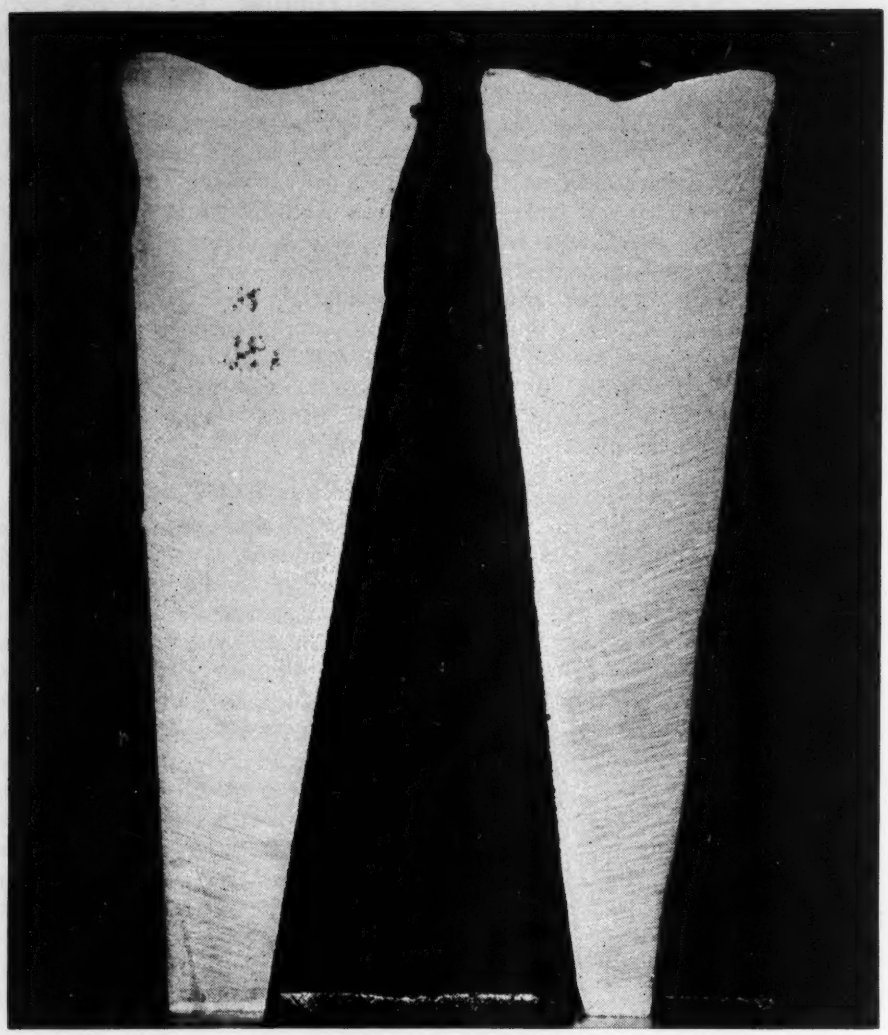


Fig. 11—Large wedge test bars used to determine shrinkage.

test may not only give quick, valuable information on shrinkage, but gives a good idea of depth of chill at the sharp edge, and microscopic examination shows the structure of the iron at any given section size.

Mold Conditions

No matter how uniform the iron is, as it leaves the ladle, there is still ample opportunity to get un-uniform castings through mold conditions, and other variables. In the first place, there is an optimum pouring temperature for every casting. This must be determined by experience and experiment. Pouring temperature will affect formation of cavities, tendency of sand to burn in, and so forth. For routine work, the optical pyrometer gives good results. Frequent checks on temperature of iron at the spout, and at pouring station, are a very definite help in promoting uniformity.

It is almost unnecessary to state that uniform castings cannot be made unless the sand is uniform. H. W. Dietert[17] in A.F.A. *Transactions* points out in detail that the condition of the sand affects the iron in depth of chill, fluidity, shrinkage cavities and structure. It is realized that an experienced molder can do a very good job preparing his sand heap for any particular pattern, but for regular control of sand uniformity, some equipment is essential. Besides the ordinary apparatus for permeability, strength, moisture and other sand properties, there is more elaborate equipment for large foundries. It is believed that Dietert's newer work on the high temperature strength of sand will be of great value in promoting uniformity of castings.

The deleterious effect of hydrogen in steel castings has been studied extensively, and it seems probable that hydrogen and other gases have an equally important effect on cast iron. For example, A. S. Klopf[18] has shown in the *American Foundryman*, the thoroughly objectional pinholes in castings can be caused by wet facing sand, or wet ladle linings.

Meeting Specifications

Every casting has to meet a specification of some kind. It may be the forcefully expressed opinion of a lathe operator, or the careful tests of a laboratory, or the pounding of heavy truck tires on a manhole cover. The more uniform the castings can be made, the easier it will be to meet specifications. It is, of course, always the worst casting or test bar that is tested, and hundreds of good castings may be rejected, because of some brief lapse in mixtures, cupola operation, or sand condition.

A.S.T.M. specification A-48-36 for gray iron castings requires tensile strength only, as does Government QQ-I-652 April 4, 1939. Both of these widely used specifications leave the analysis of the castings to the foundry, which is the modern tendency in specification writing. In other words, the purchaser specifies the physical properties he requires, and the foundry meets these in whatever way is consistent with his process and equipment. For example, one foundry might be operating with high steel scrap mixtures, and it might be possible to meet a 40,000 lb. minimum tensile specification, without any changes. Another foundry running on lighter castings, with higher carbon iron, would find it more economical to meet the 40,000 lb. specification, by small alloy additions in the ladle.

The writer believes that the old habit of placing a limit on sulphur in regular grades of gray iron has long outlived its usefulness, due to our better understanding of sulphur-manganese control.

As machinability is one of the requirements which has to be met most frequently, it would seem desirable for the foundries

to do more testing along these lines. Machinability is affected by many variables, such as silicon, manganese, sulphur, phosphorus, total carbon, combined carbon, all the alloys, cupola conditions, pouring conditions, mold conditions, weather, and many other variables. The simple file test is often effective, depth of chill is a good indicator, and Brinell hardness number is very widely used.

Personally, in connection with the Brinell test, the writer prefers a simple drill penetration test. This can be installed at small expense in any foundry. A very simple form of the equipment is a drill press with a weight on top. The distance that a sharp drill will penetrate in a given number of seconds will give a very fair idea of the machinability of the iron. This equipment can be used in correlating Brinell with machinability, and when used regularly can be a real factor in promoting uniformity of castings and, incidentally, increase machine shop production.

Service to Customers

The day is past when the customer simply bought "gray iron castings." He is asking for, and getting, far more in the way of quality than he has in the past. Whether by improved foundry processes, or by the judicious use of alloys, the foundry is now able to supply the customer nearly anything he wants, whether strength, resistance to heat, resistance to corrosion, resistance to wear, better impact values, or super-machinability. It is believed that the great improvement in the uniformity of gray iron castings, such as has been made possible by current control methods, marks an important step in the service rendered by the gray iron industry.

Acknowledgement

The author wishes to acknowledge with thanks the photomicrographs shown in Figs. 5, 6, 7 and 8 furnished by courtesy of Rebecca H. Smith.

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Surveys Louisiana Sand Deposits

By Dr. H. Ries,* Ithaca, N. Y.

"The Sand and Gravel Deposits of Louisiana," by T. P. Woodward and A. J. Gueno, Jr., and *"Subsurface Pleistocene,"* by J. W. Frink, State of Louisiana, Department of Conservation, Geology Bulletin 19, 437 pp., 1941.

This is a very detailed and profusely illustrated report which describes the sand and gravel deposits of the state in detail. After briefly discussing the properties of sand and gravel, some 10 pages are devoted to their uses.

Curiously enough the report makes no mention of the foundry uses of sand for molding. However, the sieve analyses, which are given of the sands from dozens of localities will be of interest to the foundryman in search of supplies.

The method of sieve analysis consisted of putting the sample in a basin of water, stirring and then letting stand for 15 seconds, after which the suspended material is poured off and evidently determined by difference. The balance of the sample is separated by sieves which are shaken for 20 min. in the Ro-tap.

The report is well worth consulting by those seeking information regarding Louisiana sands.

*Technical Director, Foundry Sand Research Committee.

Dr. Gillett Chosen as 1942 Lecturer Before I. B. F.

DR. H. W. Gillett, honorary member of A.F.A. and 1932 A.F.A. medallist, chief technical advisor, Battelle Memorial Institute, Columbus, Ohio, has again been signally honored. From the office of the Institute of British Foundrymen, Manchester, England, comes the announcement that Dr. Gillett has been chosen as the Institute's 1942 Edward Williams lecturer, established in 1935. Previous lecturers have been limited to noted scientists in the steel and iron industry of Great Britain, these being:

1935—Sir William J. Larke.
1936—Professor A. L. Mellanby.
1937—Dr. C. H. Desch.
1939—Sir Laurence Bragg.

Members of the Association are pleased to see Dr. Gillett so recognized and know that the I.B.F. is to be congratulated on its choice.

This lecture was founded by one of the past presidents of the I.B.F., Mr. C. E. Williams of South Wales.

NEW MEMBERS

Membership Note: With the beginning of the new season of chapter meetings, our old members will have the pleasure of welcoming many new members to Association activities. Friendship in a group working together in a common industry is one of the most valuable of A.F.A. membership benefits. The Association is pleased to welcome those new members reported here and in the previous issues of American Foundryman. Old members of chapters now have the opportunity of making these new members welcome as they meet with you from month to month.

(August 21 to September 22, 1941)

Conversions

Sustaining from Company

Whitehead Bros. Co., New York, N. Y. (Alfred J. Miller, President)

Birmingham Chapter

Fred Barbour, McWane Cast Iron Pipe Co., Birmingham, Alabama
J. W. Brown, McWane Cast Iron Pipe Co., Birmingham, Alabama
J. W. Harris, McWane Cast Iron Pipe Co., Birmingham, Alabama
Frank Kopp, McWane Cast Iron Pipe Co., Birmingham, Alabama
*LeTourneau Company of Georgia, Toccoa, Georgia (Clarence H. Cline, Metallurgist)
A. R. Marcus, McWane Cast Iron Pipe Co., Birmingham, Alabama
J. C. Mayo, McWane Cast Iron Pipe Co., Birmingham, Alabama
W. R. Miller, Jr., McWane Cast Iron Pipe Co., Birmingham, Alabama.

Central Indiana Chapter

Arthur C. Levy, Repr., Federated Metal Div., American Smelting & Refining Co., Indianapolis, Ind.

Central New York Chapter

Karl E. Reynolds, Syracuse, N. Y., Sales Engr., A. P. Green Fire Brick Co., Mexico, Mo.

Chicago Chapter

B. J. Aamodt, Fdry. Supt., National Malleable & Steel Castings Co., Cicero, Ill.
*Allied Steel Casting Co., Chicago, Ill. (W. L. Beaudway, Gen'l Mgr.)
*Dole Valve Co., Chicago, Ill. (J. A. Reinhardt, Chief Engineer)
H. Evans, Allied Steel Casting Co., Chicago, Ill.
W. Harrison, Allied Steel Casting Co., Chicago, Ill.
J. Lechner, Allied Steel Casting Co., Chicago, Ill.
J. C. Mulhern, Finishing Supt., National Malleable & Steel Castings Co., Cicero, Ill.
John L. Neary, President, Acme Silica Sand Co., Ottawa, Illinois
R. P. Schauss, Metallurgist, National Malleable & Steel Castings Co., Cicero, Ill.
R. T. Steindorf, District Mgr., Chain Belt Co., Chicago, Illinois
C. B. Teeter, Sales Repr., Chicago Mfg. & Distributing Co., Chicago, Ill.
A. VandenBerg, Allied Steel Casting Co., Chicago, Ill.
B. C. Yearley, Fdry. Supt., National Malleable & Steel Castings Co., Cicero, Ill.

Cincinnati Chapter

Walter J. Newman, Vice Pres., Newman Bros., Inc., Cincinnati, Ohio
Bernard J. Warman, Supt. & Gen'l Mgr., Warman-Martin Aluminum Fdry. Co., Cincinnati, Ohio
John W. Young, Owner, Economy Pattern & Casting Co., Cincinnati, Ohio

Detroit Chapter

Robert L. Hardy, Melting Foreman, Kelsey-Hayes Wheel Co., Detroit, Mich.
*Huron Industries Co., Alpena, Mich. (H. C. Farrell, Gen. Mgr.)
F. M. Johnson, Sales Mgr., Surface Combustion Corp., Toledo, Ohio

Metropolitan Chapter

*Fischer Fdry. Div., Bound Brook Oil-Less Bearing Co., Bound Brook, N. J. (A. C. Leverton, Project Engr.)
Herman Seidel, Jr., Met., Eclipse Aviation Corp., Bendix, New Jersey

Michiana Chapter

H. S. Heckaman, President, Bremen Gray Iron Foundry, Inc., Bremen, Ind.
*Logansport Radiator Equipment Co., Logansport, Ind. (James E. Digan, Sec.).
Arthur T. Ruppe, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
Russell Rush, Argos Foundry Co., Plymouth, Ind.
Howard B. Voorhees, Asst. Supt. Fdry., Dodge Mfg. Corp., Mishawaka, Ind.

Northeastern Ohio Chapter

Joseph B. Duff, Teacher, Patternmaking, East Tech High School, Cleveland, Ohio
William E. Eccles, Insp. Engr., Cooper-Bessemer Corp., Grove City, Pa.
Arthur Hanford, Foreman, National Malleable & Steel Castings Co., Cleveland, Ohio
Joseph J. Parker, Plant Supt., SPO, Inc., Cleveland, Ohio
Stephen Snople, National Malleable & Steel Castings Co., Cleveland, Ohio

Philadelphia Chapter

Lloyd T. Achenbach, Sr., Time Study, Lebanon Steel Foundry, Lebanon, Pa.
*Union Mfg. Co., Boyertown, Pa. (Paul B. Harner, Vice Pres.)

Quad City Chapter

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John Morrow, Foreman, Bettendorf Co., Bettendorf, Iowa.
R. H. Swartz, Metallurgist, Bettendorf Co., Bettendorf, Iowa.

Southern California Chapter

Paul E. Crow, Metallurgist, Los Angeles Steel Casting Co., Los Angeles, Calif.

Western Michigan Chapter

E. H. Baum, Sales Mgr., Michigan-Inland Foundry Co., Muskegon, Mich.
Wm. Grant, Supt., Michigan-Inland Foundry Co., Muskegon, Mich.
*Michigan-Inland Foundry Co., Muskegon, Mich. (Paul Wiener, Owner)

Wisconsin Chapter

John H. Costa, Iron Dist., Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Harold B. Daehn, Molder, Pelton Steel Casting Co., Milwaukee, Wis.
Paul Nichols, Fdry. Foreman, Nash Motors Co., Nash-Kelvinator Div., Kenosha, Wis.
George E. Schubert, Castings Engr., Ampco Metal, Inc., Milwaukee, Wis.
Emmanuel Skarakis, Molding Foreman, Nash Motors Co., Nash-Kelvinator Div., Kenosha, Wis.
Theo. Spella, Foreman, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Outside of Chapter

*Crawford Steel Foundry Co., Bucyrus, Ohio (Frank D. Glosser, Vice Pres.)
Millard J. Hino, Fdry. Molder, U. S. Submarine Base, Coco Solo, Canal Zone
*Pennsylvania Electric Steel Casting Co., Hamburg, Pa. (H. R. Schollenberger, Pres.)
C. P. Randall, Wollaston, Mass., Service Eng., Eastern Clay Products, Inc., Eifort, Ohio.

*Company.

Midwest Foundrymen to Gather at Purdue University

THE campus of Purdue University, West Lafayette, Ind., will be the point of interest for foundrymen in the middle west on October 17-18 when the joint regional foundry conference, under the sponsorship of the Central Indiana, Michiana and Chicago chapters of the American Foundrymen's Association and Purdue University gets under way. Final arrangements have been made for the program. Sessions will be held in the Purdue Union Building where excellent facilities are available. The conference arrangements have been under the direction of a capable and energetic committee whose personnel was announced in the September issue of *American Foundryman.*

The committee has been fortunate in securing outstanding speakers for the various sessions, and many sessions will discuss the shortage of raw materials and its effect on the various foundry processes. As a climax to this subject, E. L. Shaner, president, Penton Publishing Co., Cleveland, Ohio, has been secured as the speaker at the joint chapter dinner on Friday evening. His subject will be "Materials Shortages — Present and Future." Mr. Shaner is extremely well versed in this subject, in which all foundrymen are interested. The following is a day by day outline of the program:

Tentative Program

Friday, October 17

9:00 a. m.—Registration.

10:00 a. m. — 12:00 a. m. — Gray Cast Iron.

Technical Chairman. Arthur S. Klopf, vice president, Hansell-Elcock Co., Chicago.

Subject: "Substitutions in Raw Materials for Melting Because of Shortages," by M. J. Gregory, factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill.

10:00 a. m.—12:00 a. m.—Malleable Cast Iron.

Technical Chairman: L. H. Rudesill, metallurgist, Griffin Wheel Co., Chicago.

Subject: "Substitutions and Shifts in Melting Materials Because of Shortages," by P. A. Paulson, metallurgist, Gunite Foundries Corp., Rockford, Ill.

10:00 a. m.—Steel.

Technical Chairman: V. A. Crosby, metallurgical engineer, Climax Molybdenum Co., Detroit.

Subject: "Present Situation in Alloys," by D. B. Reeder, metallurgist, Electro Metallurgical Co., Chicago.

10:00 a. m.—12:00 a. m.—Nonferrous.

Technical Chairman: Clifford McKelvey, superintendent, brass foundry, Chicago Hardware Foundry Co., North Chicago, Ill.

Subject: "Melting of Non-Ferrous Metals to Meet Physical Properties and Specifications," by W. B. George, metallurgist and foundry engineer, R. Lavin & Sons, Chicago.

2:00 p. m. — 4:00 p. m. — Gray Cast Iron.

Technical Chairman: R. F. Hine, foundry metallurgist, Studebaker Corp., South Bend, Ind.

Subject: "Effect on Melting Practices Due to Substitutions of Materials Because of Shortages," by Dr. James T. MacKenzie, chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala.

Earl Shaner To Address Purdue Conference

EARL L. SHANER, president, Penton Publishing Co., Cleveland, Ohio, scheduled to address the dinner meeting of the Joint Chapter Regional Foundry Conference to be held at Purdue University, West Lafayette, Ind., on Oct. 17, is one of the foremost authorities on present day business conditions in the iron and steel industry. As president of the Penton Publishing Co., publishers of the magazines *Steel, The Foundry, Machine Design, Daily Metal Trade* and *New Equipment Digest,* he has followed closely the recent developments affecting the foundry and allied industries. His editorials have been outstandingly informative and direct.

E. L. Shaner

Mr. Shaner has been particularly close to the foundry industry and the American Foundrymen's Association, serving as secretary of the A.F.A. program committee and editor of A.F.A. *Transactions* through 1919-21. A native of Olean, N. Y., Mr. Shaner received his engineering training at Purdue University, graduating in 1914 with a degree of B.S. in Mechanical Engineering. Previous to entering Purdue, he was clerk, machinist helper, and apprentice with the Pennsylvania R.R., continuing to work with this company after finishing at Purdue as special apprentice and assistant roundhouse foreman.

In 1916 he became connected with the Penton Co., serving two years as editorial representative on *Iron Trade Review* (now *Steel*). Then for two years he was in the army serving in the A.E.F. and with Army of Occupation, going from Argonne to the Rhine. Following this army service, he resumed work with the Penton Co., being made managing editor of *Steel* in 1925, then editor in 1927 and editor-in-chief in 1937, at which time he became president and treasurer of the Penton Co. He is a member of the American Society of Mechanical Engineers, Cleveland Engineering Society and the American Iron and Steel Institute.

2:00 p. m.—4:00 p. m.—Malleable Cast Iron.

Technical Chairman: J. H. Lansing, shop practice engineer, Malleable Founders' Society, Cleveland.

Subject: "Replacement of Non-Ferrous and Forged Steel Parts

J. D. Burlie, Chicago, Chapter, General Chairman, Conference Committee

with Pearlitic Malleable Iron," by Carl F. Joseph, metallurgist, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.

2:00 p. m.—4:00 p. m.—Steel.

Technical Chairman: H. A. Forsberg, general superintendent, Continental Roll & Steel Foundry Co., East Chicago, Ind.

Subject: "Controlled Directional Solidification," by F. A. Melmoth, vice president, Detroit Steel Casting Co., Detroit.

2:00 p. m.—4:00 p. m. — Non-Ferrous.

Technical Chairman: Robert Langsenkamp, sales manager, Langsenkamp-Wheeler Brass Works, Inc., Indianapolis.

Subject: "Core Practices and Molding Sands for Non-Ferrous Castings," by H. W. Dietert, president, Harry W. Dietert Co., Detroit.

7:00 p. m.—Joint Chapter Dinner.

Subject: "Materials Shortages—Present and Future." *Speaker:* E. L. Shaner, president, The Penton Publishing Co., Cleveland. Publisher of *The Foundry, Steel,* and *Daily Metal Trade.* Student entertainment.

Saturday, October 18

9:30 a. m. — 11:30 a. m. — Gray Cast Iron.

Technical Chairman: Martin Lefler, foundry manager, Western Foundry Co., Chicago.

Subject: "Modern Methods of Gating and Risering," by Elmer J. Carmody, foundry engineer, Charles C. Kawin Co., Chicago.

R. L. McIlvaine, Central Indiana Chapter, General Vice Chairman, Conference Committee

9:30 a. m.—11:30 a. m.—Malleable Cast Iron.

Technical Chairman: G. B. Stantial, foundry superintendent, Illinois Malleable Iron Co., Chicago.

Subject: "Gating and Molding Practice," by C. C. Lawson, superintendent, Wagner Malleable Iron Co., Decatur, Ill.

9:30 a. m.—11:30 a. m.—Steel.

Technical Chairman: S. E. McGinty, metallurgist, Burnside Steel Foundry Co., Chicago.

E. F. Ross, Chicago Chapter, Secretary, Conference Committee

Subject: "Electric Furnace Melting and Construction," by B. J. Aamodt, foundry superintendent, National Malleable & Steel Castings Co., Chicago, and W. Harvey Payne, president and general manager, Hydro-Arc Furnace Corp., Chicago.

9:30 a. m. — 11:30 a. m. — Non-Ferrous.

Technical Chairman: G. E. Stoll, metallurgist, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind.

Subject: "Aluminum Castings," by F. E. Carl, assistant foundry superintendent, Delco-Remy Division, General Motors Corp., Anderson, Ind. "Magnesium Castings," by M. E. Brooks, metallurgist, Dow Chemical Co., Midland, Mich.

Purdue Memorial Union Building Where Conference Sessions Will Be Held.

1:00 p. m.—3:00 p. m.—Gray Cast Iron.

Technical Chairman: R. L. McIlvaine, foundry engineer, National Engineering Co., Chicago.

Subject: "Factors Affecting Surface Finish of Castings," by W. G. Reichert, general foundry metallurgist, American Brake Shoe & Foundry Co., Mahwah, N. J.

1:00 p. m.—3:00 p. m.—Malleable Cast Iron.

Technical Chairman: E. C. Bumke, superintendent, Malleable Division, Oliver Farm Equipment Co., South Bend, Ind.

Subject: "Factors Affecting Surface Finishing and Methods of Cleaning," by James H. Lansing, shop practice engineer, Malleable Founders' Society, Cleveland.

1:00 p. m.—3:00 p. m.—Steel.

Technical Chairman: L. B. Thomas, chief metallurgist, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

Subject: "Triplex Melting of Steel," by A. W. Gregg, foundry engineer, Foundry Equipment Division, Whiting Corp., Harvey, Ill.

1:00 p. m.—3:00 p. m.—Non-Ferrous.

Technical Chairman: Robert Langsenkamp, sales manager, Langsenkamp-Wheeler Brass Works Inc., Indianapolis.

Subject: "Gates and Risers for Non-Ferrous Castings," by W. B. George, metallurgist and foundry engineer, R. Lavin & Sons, Chicago.

Time not established—Student Meeting.

Chairman: C. E. Westover, executive vice president, American Foundrymen's Association, Chicago.

Subject: "Properties and Uses of Castings," by Col. W. W. Rose, executive vice president, Gray Iron Founders' Society, Cleveland.

Apprentice Contest Winner

IN an earlier issue of the *American Foundryman* the association presented the pictures of those apprentices who won places in the National Apprentice Contest. At that time the association did not have the picture of Burton Bevis, Caterpillar Tractor Co., Peoria, Ill. We now take pleasure in presenting the picture of Mr. Bevis, who won third place honors in the gray iron molding division of the apprentice contest.

Burton Bevis

South American Shows Sample of Work

SENT to us recently by Julio Fernandez, one of our South American members, is this picture showing a low nickel-chromium cast steel gear. The casting was made in the experimental foundry of the university, Taller Experimental de Fundicion de Acero Universidad Tecnica "Federico Santa Maria," Valparaiso, Chile.

New Committee Members

Foundry Sand Research Committee — Subcommittee on Durability.
- Loris Diran, Lebanon Steel Foundry, Lebanon, Pa.
- R. Tegman, Foundry Met., American Brake Shoe & Foundry Co., Mahwah, New Jersey.

Gray Iron Division Handbook Revision Committee.
- Robert Gregg, Fdry. Mgr., Reliance Regulator Corp., 1000 Meridian Ave., Alhambra, Calif.

Non-Ferrous Division — Program and Papers Committee.
- R. W. Parsons, Met., Ohio Brass Co., Mansfield, Ohio.

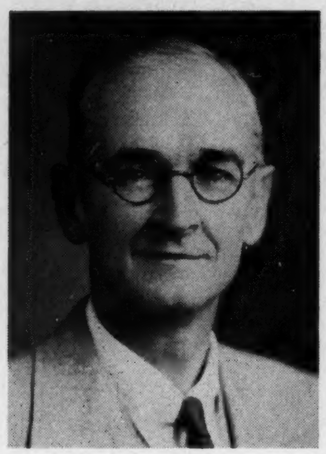
Non-Ferrous Division — Recommended Practices Committee.
- W. W. Edens, Met., Ampco Metal, Inc., 1745 So. 38th St., Milwaukee, Wis.

Steel Division Handbook Revision Committee.
- D. C. Zuege, Tech. Dir., Sivyer Steel Castings Co., Milwaukee, Wis.

Gray Iron Division Committee on Analysis of Casting Defects.
- L. E. Everett, Fdry. Supt., Kaukauna Machine Corp., Kaukauna, Wis.

Photograph submitted by Julio Fernandez, Taller Experimental de Fundicion de Acero Universidad Tecnica "Federico Santa Maria," Valparaiso, Chile, of a low nickel-chromium steel gear.

NEW CHAPTER OFFICERS

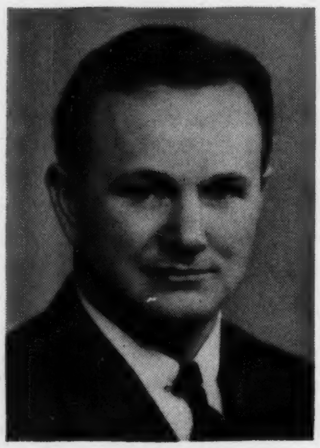


H. M. Wood
W. W. Sly Mfg. Co.,
Cincinnati, Ohio
Secretary
Cincinnati District Chapter

K. A. DeLonge
International Nickel Co.,
New York, N. Y.
Secretary
Metropolitan Chapter

L. H. Denton
Baltimore Association of Commerce, Baltimore, Md.
Secretary-Treasurer
Chesapeake Chapter

L. L. Andrus
American Foundry Equipment Co., Mishawaka, Ind.
Secretary-Treasurer
Michiana Chapter



G. K. Dreher
Ampco Metal, Inc.,
Milwaukee, Wis.
Secretary
Wisconsin Chapter

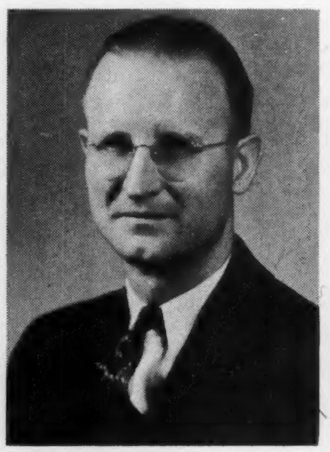
J. M. Lathrop
"The Foundry," Cleveland, Ohio
Secretary
Northeastern Ohio Chapter

A. H. Allen
Penton Publishing Co.,
Detroit, Mich.
Secretary
Detroit Chapter

E. Armstrong
Inter-Allied Foundries of New York State, Buffalo, N. Y.
Secretary
Western New York Chapter

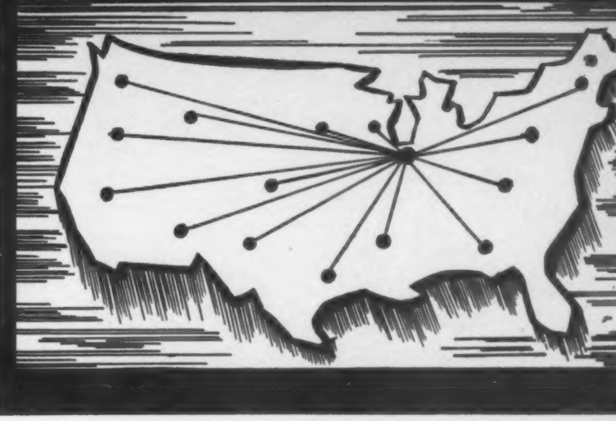
B. L. Simpson
National Engineering Co.,
Chicago, Ill.
Secretary
Chicago Chapter

R. F. Lincoln
Osborn Mfg. Co.,
Cleveland, Ohio
Treasurer
Northeastern Ohio Chapter



R. A. Thompson
Electric Steel Castings Co.,
Indianapolis, Ind.
Secretary
Central Indiana Chapter

W. W. Bowring
Frederic B. Stevens, Inc.,
Detroit, Mich.
Treasurer
Detroit Chapter



Chapter Activities

Southern California Holds Annual Stag Picnic

By W. D. Bailey, Jr.*, Los Angeles, Calif.

THE ingredients for a good time at the fourth annual stag picnic of the Southern California chapter called for nothing but the Lakewood Country Club and a few hundred foundrymen. Both were quite easy to obtain and when mixed well together resulted in one of the best stags the chapter had ever sponsored.

The affair started in the morning with 40 men entered in the chapter's golf tournament. With the aid of that western pioneer spirit and stout hearts these men walked out to do battle with old man par and came back looking like the last survivors of an African safari.

Rumors have been flying out of the west that the foundrymen defeated the suppliers in their annual ball game. A four round boxing bout, a by-product of the game, was produced when a slight "misunderstanding" happened on the diamond. Horse shoe pitching and races of all kinds were featured during the afternoon, with nearly everyone enjoying and participating in the fun.

"Under a spreading eucalyptus tree" could be found those who enjoyed slight refreshments and songs rendered by Pete Valentine's San Francisco Songbirds.

In the evening a buffet dinner was served and a floor show was presented.

The chapter took 8 mm. colored movies of their outing and are preparing the film for use if other chapters would care to borrow it. The film would take about 20 minutes to run.

*Pacific Metals Co., Ltd., and Secretary, Southern California chapter.

The Southern California chapter started the new year off with a successful stag picnic in August when over 300 foundrymen gathered for a day of fun.
(Photos courtesy W. D. Bailey, Jr., Pacific Metals Co., Ltd.)

Northeastern Ohio Opens Season

By Edwin Bremer*, Cleveland, O.

ATTENDANCE of approximately 130 members and guests at the opening meeting of the Northeastern Ohio chapter on September 11 presaged a good 1941-42 season. Frank Dost, Sterling Foundry Co., Wellington, Ohio, and president of the chapter, presided. He called on Jack Lathrop, secretary, who introduced Francis D. Bowman, advertising manager, Carborundum Co., Niagara Falls, N. Y., who gave a brief, interesting talk on manufactured abrasives, and their wide application in modern industry.

He pointed out that natural abrasives such as emery, corundum, garnet and sandstone vary considerably in uniformity and physical properties, but manufactured abrasives are made under controlled conditions which assure uniform, dependable prod-

*Metallurgical Editor, *The Foundry*, and Chairman, Publicity Committee, Northeastern Ohio chapter.

Throwing darts and shooting rifles seemed to be the main diversion of foundrymen at the Ontario party held in August.

ucts day in and day out. During a period of about 50 years, production has risen from a few ounces a day to millions of pounds a month, and manufactured abrasives are available in grain form as well as finished products, such as grinding wheels, rubbing bricks, honing stones, and other products. Applications range from course rough work, such as snagging castings, to precision grinding requiring accuracy in millionths of an inch.

After Mr. Bowman's talk, a sound motion picture on the same subject was shown through courtesy of the Carborundum Co.

Defense Talks at First Northern California Meeting

By Geo. L. Kennard,* San Francisco California

THE first fall meeting of the Northern California chapter was in charge of Vice Chairman F. A. Mainzer, Pacific Brass Foundry, as Chairman E. M. Welch was delayed in getting back from his vacation. The attendance numbered about 65.

A general meeting concerning activities of importance to Pacific Coast foundrymen was conducted with emphasis being put on the Defense Training Course to be given at the University of California. Thos. J. Adams, metallurgist, Columbia Steel Co., will teach a class in this course and will use the Association's *Cast Metals Handbook* for a text. A telegram from Executive Vice President C. E. Westover was received and read to the audience.

Col. F. M. Smith, Federal Reserve Bank, 12th District, and Andrew L. Kerr, district representative of O.P.M., scheduled speakers, were in turn called on to outline the duties of their respective offices, going over in detail the many problems confronting foundrymen and those who serve them. Shortage of materials, violation of the fixed prices, Government co-operation with the small businessman to make full use of his ability, equipment and personnel to advance production either by direct or subcontract, so that he and those dependent on him will not suffer, were the major questions considered.

*Northern California Foundrymen's Institute, and Secretary-Treasurer, Northern California chapter.

First Ontario Meeting A Picnic

By G. L. White*, Toronto, Ont.

WHAT is so rare as a day off — but when Ontario chapter officials began to count over the number of foundrymen assembled for their outing, they found that somehow over 100 men had been able to get away from flasks and molds long enough to have a day of fun. The outing was held at the estate of Rolph Barnes, W. R. Barnes Co., Ltd., at Waterdown.

For those who managed to obtain sand rammers, mallets, shovels and other handy foundry gadgets from tool rooms there was golf, and many a ruler and slide rule was seen carried by those who liked to pitch horse shoes and to round out the program competitive rifle shooting and dart throwing was done.

A picnic supper was served after which the prizes for the day's "work" were awarded.

The picnic committee, headed by Rolph Barnes, W. R. Barnes Co., Ltd., *chairman;* C. C. MacDonald, Frederic B. Stevens of Canada, Ltd.; Robert Robertson, International Harvester Co. of Canada, Ltd.; Russell Woods, George F. Pettinos (Canada), Ltd.; and L. B. Morris, Gurney Foundry Co., Ltd., did an excellent job in lining up the program and seeing that the affair ran smoothly.

*Westman Publications, Ltd., and Secretary-Treasurer, Ontario chapter.

Cincinnati District Hears Federal Agent

By Henry M. Wood,* Cincinnati, O.

THE fall opening meeting of the Cincinnati District chap-

*W. W. Sly Mfg. Co., and Secretary, Cincinnati District Chapter, A.F.A.

ter was held at Shuller's Restaurant, Cincinnati, with sixty members and guests in attendance. H. F. McFarlin, Lunkenheimer Co., chairman last year, opened the meeting by presenting Wm. M. Ball, Jr., Edna Brass Mfg. Co., as the chapter's newly elected chairman. Chairman Ball introduced Raymond C. Suran, Special Agent, Federal Bureau of Investigation, as the speaker of the evening. Mr. Suran held the closest attention of the members as he discussed "The F.B.I. in Co-operation with National Defense." All agreed that Mr. Suran covered, in a most interesting manner, the work of the F.B.I. in counteracting espionage, sabotage and "fifth column" activities.

ing agents. The outstanding observation was the levelling effect of use. Sands with widely divergent characteristics became almost identical after repeated use.

No. Illinois-So. Wisconsin Chapter Starts Year Discussing Bonding Material

By J. R. Cochran,* Rockford, Ill.

THE first meeting of the new year of the Northern Illinois-Southern Wisconsin chapter was held at Hotel Faust, Rockford, Ill., with Chapter Chairman George Minert, Gunite Foundries Corp., presiding. Some 60 members and guests were present. Chairman Minert announced that the membership committee would be headed by John Claussen, Greenlee Bros. Co., while Herb Klopf, Fairbanks Morse Co., Beloit, would serve as chairman of the program committee.

Action was taken to join with the local A.S.M. chapter in sponsoring a joint meeting later in the year.

The technical section of the meeting was given over to a discussion of bonding materials for molding sands. A. S. Nichols, Illinois Clay Products Co., showing moving pictures, discussed the history and development of fire clay deposits, presenting a discussion of present day methods of processing the clay. He then described the equipment and methods used in laboratory controlled tests on the properties of different bonding agents and in synthetic molding sands, illustrating the foundry operations carried on during the tests.

Fred L. Overstreet, Illinois Clay Products Co., who designed the test on bonding agents, gave a discussion on the development of the pattern to give optimum conditions for the appearance of any or all defects commonly attributed to sand conditions. He then presented a summary of the observed results of the test.

Fred Hintze, who supervised the test work, gave a report on the characteristics of the sands bonded with the various bond-

*Metallurgist, Sundstrand Machine Tool Co., Fdy. Div., and Technical Secretary, Northern Illinois-Southern Wisconsin Chapter.

Woodliff Leads Off for St. Louis

By Jack Kelin,* St. Louis, Mo.

MANY local foundrymen and guests turned out for the first meeting of the St. Louis chapter to hear Earl Woodliff, H. W. Dietert Co., Detroit, Mich., talk on "Core and Sand Testing." C. B. Shanley, Semi-Steel Castings Co., chapter vice chairman, was the presiding officer.

The speaker presented an interesting discussion of core and

*Federated Metals Division, A. S. & R. Co., and Secretary-Treasurer, St. Louis District chapter.

Entertainment for everyone was the theme at the Ontario outing but we will bet our best red kilt that the Lock Lomond boys (top right) stopped the show with their musical bagpipes.

sand testing and highlighted his talk with an explanation of various pieces of sand testing equipment which he had on exhibit. The discussion period which followed provided members ample opportunity to ask the speaker numerous questions concerning sand problems occurring in their respective plants.

A coffee talk by C. R. Culling, Carondelet Foundry Co., relating to priorities and their operation as far as iron foundries are concerned was received with great interest by the audience.

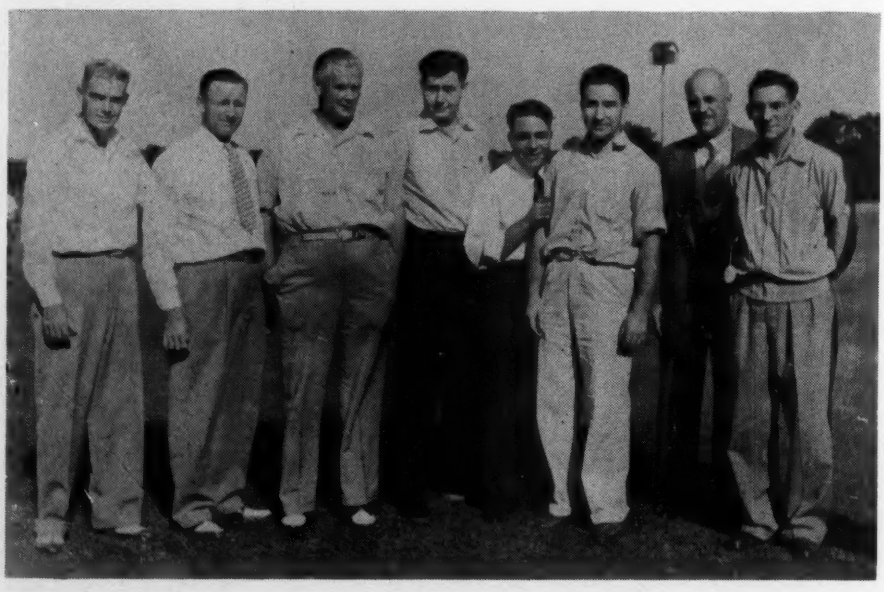
Chapter Chairman Don Seyferth, West Michigan Steel Foundry Co., was fortunate in having an efficient outing committee under the chairmanship of A. E. Jacobson, Grand Haven Brass Foundry, Grand Haven, Mich. Max Amos, Standard Automotive Parts Co., and chapter secretary, handled ticket sales. The golfers were controlled by Otto Jentsch, Wolverine Brass Co., and Harold BeMent, Campbell, Wyant & Cannon Foundry Co. The baseball game was directed by Charles Locke and C. H. Cousineau, both of West Michigan Steel Foundry Co.; horseshoe pitching by Jack Livingston, Blackmer Pump Co., and the turtle races by Rudolph Flora, Clover Foundry Co.

Congratulations to the chapter for an excellent affair.

Western Michigan Holds First Outing

THE "not quite baby" chapter, Western Michigan, opened its first year's activities with a most enjoyable outing at the Spring Lake Country Club, near Grand Haven. With ideal weather prevailing and a beautiful spot, over 200 members and guests participated. The golfers assembled early and late, others participated in such events as horseshoe pitching, baseball and the turtle races.

An unusual feature for a chapter outing was provided through the generosity of J. Johnson, Muskegon Piston Ring Co.; D. J. Campbell, Campbell, Wyant & Cannon Foundry Co.; and A. E. Jackson, Grand Haven Brass Co., who donated the use of their cabin cruisers and speedboats, taking groups for rides up and down Spring Lake, which has a most magnificent scenic shoreline of beautiful estates. Following the dinner, entertainment was furnished by local gymnasts who showed professional ability. During the dinner, the justly famous Muskegon Barber Shop Quartette sang. C. J. Lonnee, Muskegon Piston Ring Co., lead the informal dinner singing, showing ability in getting the crowd together. The dinner was a delightful Peninsula club buffet style with the club's chef taking delight in displaying huge ice letters A.F.A. The affair was concluded with prizes for those lucky in the day's events.



Executive Vice President Westover (second from right) poses with a few members of the Western Michigan Chapter at their outing.

Defense Contract Discussion at Opening New England Meeting

By M. A. Hosmer,* Boston, Mass.

THE New England Foundrymen's Association opened its current season with an exceptionally well attended meeting at the Engineers' Club, Boston. More than eighty members and guests were present.

Following the dinner, Charles O. Butler, president of the association, introduced Edward V. Hickey, district manager, defense contract service, OPM, who told in a most interesting manner how this service came about and what it is attempting to accomplish. He said that the present war is largely a question of who can produce and deliver first, the largest quantity of certain materials used in fighting. In order to carry out such a procedure, every man and every company must be doing everything possible.

Some months ago only fifty-six companies in this country were producing a very large percentage of defense contracts. Naturally this had to be broadened and to facilitate this distribution of government contracts, a certain code or method of procedure in the form of commandments met the approval of the President, the essential points of which Mr. Hickey outlined and explained. Regulation No. 1 explains in general that every bid of over $50,000 must be open to everyone. No. 2 states that fifteen days must elapse be-

*Chemist, Hunt-Spiller Mfg. Co., and Reporter, New England Foundrymen's Association.

tween the date the bid was given out and the closing date of same. No. 3 deals with the breakdown of large contracts so that bids can be made on a part of it as well as on the whole. The order does not have to go entirely to the lowest bidder. No. 4 requires the exhibition of componants so that small concerns can see just what parts are suitable for their manufacture. No. 5 says orders will be given where possible to regions or districts which are at that time handling less than their fair proportion of government orders. No. 6 states early deliveries will count. This benefits companies who have at that time few orders. No. 7 asks every contract of $50,000 or over must be accompanied by a statement of the percentage of the order which will be farmed out by the prime contractor. No. 8 enables contractors to negotiate with the procurement officer regarding his bid, up to 15 per cent above the going price.

Mr. Hickey felt that these new regulations would naturally help the small concern, as well as the government to obtain quicker deliveries and to distribute the defense orders so that all would share in the defense work.

At the conclusion of Mr. Hickey's address, Pres. Butler called upon Mr. C. E. Andrews of the Whitehead Bros. Co. of Providence, R. I., who presented a very fine introduction to the company's sound and colored moving picture "Sand."

Photos Courtesy, D. F. Seyferth, West Michigan Steel Foundry Co., K. McCrady, Muskegon Piston Ring Co. and W. Johnson, Cambell Wyant & Cannon Foundry Co.

The above photos help illustrate how and what the Western Michigan members did at their first outing. Top—The turtle races provided lots of laughs for the members. Center—J. Johnson's cabin cruiser "Elsie" was busy all day taking men for rides around the Lake. Bottom—Ready for a speed boat ride.

Twin City Initiates Season

THE Association's "baby" chapter, the Twin City, held its first meeting as a chapter at Bayport, Minn., on Saturday, September 20. Some 60 members, gathering in the early afternoon, were first taken through the foundry of the Andersen Foundry Company, with Chapter Chairman E. C. Madson, manager of the foundry, conducting the tour. Following this, Mr. Andersen, president of the company, and S. V. Wood, director of the chapter and president, Minneapolis Electric Steel Castings Company, donated the use of their cruisers for pleasure rides up and down the beautiful LaCroix River. On returning, the group was conducted through the extensive wood-working plant of the Andersen Foundry Company.

In the evening, dinner was served at the White Pine Inn. As a part of the dinner meeting, a representative of the OPM discussed the priority situation, answering questions. C. E. Westover, Executive Vice President, A.F.A., gave an interesting talk on the activities and place of the A.F.A. in the industry. He was given an enthusiastic welcome and assurance that the Twin City chapter was in line to be one of the best of the national Association.

Photos Courtesy, D. F. Seyferth, West Michigan Steel Foundry Co., K. McCrady, Muskegon Piston Ring Co. and W. Johnson, Cambell Wyant & Cannon Foundry Co.
The first Western Michigan outing provided a wide variety of entertainment as can be seen in these pictures. Top—Landlubbers take to water including Secretary R. E. Kennedy. J. Johnson, owner of boat, sits in the back row with sailor hat on. Center—The old ball game. Bottom—Wow!! (Need more be said.)

Philadelphia Plans for Season

THE chairman of the Philadelphia chapter publicity committee, B. H. Bartells, University of Pennsylvania, states that the program for the year's meetings has been well worked out. Meetings will be held on the second Friday of each month at the Engineers Club. The schedule calls for the following:

October—"Present and Future Trends of Specifications," Norman Mochel, Westinghouse Electric & Mfg. Co.

November — "Raw Material Supplies, Particularly Metals and Alloys"—speaker to be announced.

December—"Equipment Night"—Movies, "Sand."

January — "Non-Ferrous Founding," D. Frank O'Connor, Walworth Co.

February — "Radiographic Inspection, Prof. Doan, Lehigh University.

March—"Gray Iron," Dr. A. B. Kinzel, Union Carbide & Carbon Co.

April—"Regional Spring Conference," jointly sponsored by Philadelphia, Metropolitan and Chesapeake chapters at the University of Pennsylvania.

Southern California Starts Educational Course

THE Southern California chapter, in conjunction with the Los Angeles School Board, have arranged to conduct evening classes in gray iron, nonferrous and steel foundry practice. The course will include actual molding and coremaking, also cupola and pit furnace melting practice.

The course is to be presented at the Manual Arts High School Foundry, Los Angeles. The foundry at this school has been considerably enlarged so that courses in steel foundry practice can be held at the same time as the other branches of the industry. The tentative schedule is to hold practical classes two evenings each week for each group. A lecture course is to be presented on each Friday evening. These series of talks will take in discussions on sands, core binders, facing mixtures, equipment and fundamental metallurgy of iron, steel and nonferrous.

The chairman of the chapter's apprentice committee co-operating in this educational course work is Robert Gregg, Reliance Foundry Co., Alhambra. Mr. Gregg served as the chapter's first chairman in 1936-37.

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, N. Y.

Aircraft

See Aluminum Alloys, Heat Treating.
See Magnesium, Aircraft Castings.

Alloys

See Aluminum Alloys, Beryllium.
See Aluminum Alloys, Heat Treating.
See Aluminum Alloys, Properties.
See Magnesium, Alloys.

Aluminum Alloys

BERYLLIUM. *"Beryllium as a Light Metal Component,"* by C. B. Sawyer, *Metals and Alloys,* vol. 14, No. 1, July, 1941, pp. 37-39. Certain difficulties attend efforts to alloy aluminum with beryllium. In order to have the two metals alloy in the liquid state, it is necessary to use temperatures which are beyond those healthy for aluminum. Gas is readily absorbed and acts as a source of most of the ills commonly associated with it in metals. Though it is quite possible to produce ingots large enough for experimental determination of the properties of beryllium-aluminum alloys, it has not yet been possible to go much beyond this laboratory operation. A possibly interesting small use for beryllium in aluminum-base alloys is found in the claim that in quantities of about 0.005 per cent, it restrains oxidation of the molten alloy and refines the grain. (Al.)

HEAT TREATING. *"Heat Treating Aluminum-Alloy Castings," Industrial Gas,* vol. 20, No. 2, August, 1941, pp. 14, 23. The National Bronze & Aluminum Co., Cleveland, Ohio, operates a new type heat-treating furnace for castings used for aircraft engine blocks and other aircraft parts, Diesel engine frames and hundreds of other items. Approximately 5,000 to 7,000 lb. of aluminum castings are placed on a car and a special gear-rack system takes them into the furnace. Parts are solution heat treated or precipitation heat treated for the required length of time at the required temperature to produce maximum tensile strength and elongation factors. Due to the reduction in the hardness and yield strength of the alloys at the temperature at which they are heat treated, special frames with adjustable contact points to create proper tension and supports are provided to prevent the overhanging parts of the castings from warping or sagging out of shape. By arranging all the remote control buttons on the lift door and the loading car close together, it is simple for the operator to control the loading and unloading of the furnace easily at all times. Some outstanding features are: instead of the customary refractory or insulating-brick construction, this furnace is arranged with specially designed panels. The interior wall of the furnace panel is 18-8 alloy steel, while the exterior of the panel is heavy 16-gauge steel. Between walls is 8-in. of insulation to keep heat losses at a minimum. The panels are heavily reinforced horizontally and vertically. Special telescopic joints on the panels take care of contraction and expansion automatically and keep the furnace tight. The furnace can be easily taken apart and moved to another location if production facilities necessitate its movement. Capacity can be increased by adding necessary panels and increasing heat capacity. Another feature is the external radiant tube, indirect-gas-fired-heating system. (H.T.)

PROPERTIES. *"Aluminum and Aluminum Base Alloys,"* by N. E. Russel, *Canadian Metals and Metallurgical Industries,* vol. 4, No. 7, July, 1941, pp. 175-179. Aluminum has many interesting qualities such as lightness, high electrical conductivity, high thermal conductivity and other features that make it a highly useful metal. Aluminum is alloyed with other metals to form a wide range of useful alloys with much higher strengths. Heat treated casting alloys have strengths as high as 45,000 lb. per sq. in., and heat treated wrought alloys have strengths up to about 65,000 lb. per sq. in. The usual alloying metals are copper, silicon, magnesium, manganese, nickel, chromium, titanium and iron. These may be used singly or, as is more usual, several of them are used at a time. The author lists the casting alloys such as aluminum-copper, aluminum-silicon, aluminum-magnesium, and aluminum-nickel. Wrought aluminum alloys discussed are aluminum-manganese, aluminum-magnesium, aluminum-copper-magnesium-manganese, and aluminum-magnesium-silicon. The heat-treatment of aluminum alloys is outlined and discussed. The author concludes his article by presenting material on forming, scrap supplies and specifications. (Al.)

Austenite

GRAIN SIZE. *"Austenite Grain Size,"* by A. E. Focke, *The Iron Age,* vol. 148, No. 9, August 28, 1941, pp. 35-40. As a practical working concept, the writer has found that the "amorphous grain boundary hypothesis" is very useful. It provides a useful working explanation of how grains grow and the author's paper is based on this concept. In his work the author has stated do not specify an austenite grain size without carefully considering whether or not enough information is available to indicate that a particular size is necessary or desirable. If, after considering all the problems of fabrication, treatment and application, an austenite grain size restriction seems necessary, make the restriction as liberal as possible and never closer than three numbers at either end of the A.S.T.M. series, omitting intermediate ranges 4 to 6. Assume that this austenite grain size will be tested on billet samples by the McQuaid-Ehn test at 1700°F. For special purposes, it may be desirable to specify that the austenite grain size be tested at some other temperature or by some other method. Acceptance tests on material specified with a restricted austenite grain size should be tested by the McQuaid-Ehn method at 1700°F. unless the specification explicitly states that some other method be employed. (S.)

GRAIN SIZE. *"Austenite Grain Size,"* by A. E. Focke, *The Iron Age,* vol. 148, No. 10, September 4, 1941, pp. 51-53. In this section of the article the author presents a detailed discussion of the effect of austenite grain size on the toughness of steels at high hardness; on strength and hardness of normalized medium carbon steels; on hardenability; on machinability; on rate of carbon penetration and on fatigue resistance. In commenting on excepting austenite grain size which is not as specified and is different from that determined by the mill on the billets, the author suggests that a sample should be run through the regular processing which the material or part will be given in production to determine whether the observed differences on the McQuaid-Ehn test will be significant. If not as expected it might be well to reject the material, but in this emergency it would probably be better to attempt to correct the final austenite grain size by using one or more of the various manipulations described in the article. It might also be desirable to attempt to develop the correct austenite grain size by varying the treatment. (S.)

Beryllium

See Aluminum Alloys, Beryllium.

Castings

PERMANENT MOLD. *"Permanent Mold Castings," The Iron Age,* vol. 148, No. 10, September 4, 1941, p. 62. A description of the production of 160-lb. cast iron sewer rings and manhole covers at the rate of one casting every 15 min. per machine in permanent mold machines. Mold sections are heated to about 300°F. and coated with a refractory material. Other machines of similar design cast aluminum parts weighing up to 54-lb. (C.)

See Aluminum Alloys, Heat Treating.
See Magnesium, Aircraft Castings.

Cast Iron

GRAPHITE STRUCTURE. *"Graphite Structure Revealed Through New Polishing Technique," Canadian Metals and Metallurgical Industries,* vol. 4, No. 8, August, 1941, pp. 214, 216. This paper points out that perfectly polished micro-specimens of gray or malleable cast-iron can be obtained with the graphite intact. A description of the preparatory grinding process and the polishing process is presented along with what part of the general technique should be avoided if perfectly prepared specimens are to be obtained. In the preparatory grinding process for preparing metallographic specimens, the use of progressively finer grades of emery paper is preferred to those methods of loose abrasives. A series of three emery

papers, grades 1G, 1F and 00 (or their equivalents) are used. Perfectly polished specimens are rarely obtained after one polishing operation. To overcome this difficulty it has been suggested that alternate etching and polishing may be employed. Phosphoric irons are more difficult to polish by the method described herein than hematite irons, because the phosphide eutectic tends to stand up in relief; this can be avoided if the times of actual polishing are increased. The article is concluded with a discussion of various patterns and colors of graphite flakes when they appear under magnification. (C.I.)

TYPES AND PROPERTIES. *Report of Institution of Mechanical Engineers Research Committee on High Duty Cast Irons for General Engineering Purposes—Reports on Special Duty Cast Irons (Austenitic and Martensitic Irons) and Phosphoric High-Duty Irons,* External Reports Nos. 219 and 218 respectively, British Cast Iron Research Association, 16 and 8 pp. respectively. The Institution of Mechanical Engineers (British), Storey's Gate, St. James's Park, London S. W. 1, England, recently issued two reports, the first covering austenitic and martensitic irons and the second phosphoric high-duty irons. Both reports were compiled by J. G. Pearce, director and secretary, British Cast Iron Research Association.

Classes of Cast Iron

The first section of the first report is devoted to a discussion of the various types of cast iron and uses an explanation of the solidification of cast iron as the basis for describing how and why martensitic and austenitic cast irons are produced from the metallurgical standpoint. He also uses the solidification phenomena as a basis for an explanation of the structures occurring in cast iron and proceeds to divide the cast iron family into six general groups based on structure. These groups, together with the Brinell hardness range for each, is as follows:

1. Ferritic		110-140
2. Ferritic-pearlitic		140-180
3. Pearlitic		180-350
4. Austenitic		*140-160
5. Martensitic	Soft	350-450
	Hard	550-700
6. Cementitic		280-550

*160-220 with chromium.

The report then goes on to discuss the classification of cast irons, pointing out that the absence or occurrence of graphite in cast irons exert an extremely important effect on the properties, as well as does the size and distribution of the flakes or nodules. Each of the six structural groups mentioned above is described and Fig. 1 shows the grouping of the cast iron family according to structural characteristics.

Austenitic Irons

The second section of the first report deals with austenitic irons, particularly with thee general types known by the trade names, Nomag, Niresist and Nicrosilal. The first is a non-magnetic iron, containing 10 per cent nickel and 5 per cent manganese. The second is a nickel-copper-chromium iron normally, containing 14 per cent nickel, 7 per cent copper and 2 per cent chromium, and is primarily a corrosion-resisting iron. The third iron contains 18 per cent nickel, 2 per cent chromium and 5 per cent silicon normally and is said to be primarily a heat-resisting iron. A table shows the range and recommended analysis for the latter two austenitic irons.

Mechanical properties are next discussed in the following order:

1. *Static Properties* including Ultimate Stress, Transverse Rupture Stress, Deflection, Brinell Hardness and Impact Properties.

2. *Elastic Modulus,* in which the austenitic irons show an average somewhat higher than that of ordinary cast irons.

3. *Fatigue Strength.* The endurance limit of engineering cast iron is approximately one-half the ultimate tensile strength and there was little or no deviation from this approximation in the case of austenitic irons.

4. *Elevated Temperature Properties.* As in most of the discussion, a comparison is made between the Niresist and Nicrosilal irons. Temperatures are given at room temperature 538°C. and 800°C. Figures are also included for creep rate per thousand hours.

5. *Erosion, Abrasion and Wear Resistance.* Under this head, figures are given concerning an investigation by the British Institution of Automobile Engineers which showed that the austenitic irons wore approximately 10 times less per thousand miles than plain cast irons. They were said to wear better in this particular type than any other material tried except 32 per cent chromium cast irons and chromium plated cast irons. The experience of one industrial firm is given on pump erosion. This firm measured the weight loss in 24 hours of the test disc of material running at 3000 r.p.m. in mixtures of half and half sand and water, coal dust and water, and clinker and water. The loss in weight of austenitic cast iron was 0.45, 0.21, and 0.45 respectively of that of plain cast iron.

6. *Machinability.* According to one report, austenitic irons are machined as readily as ordinary cast iron, but it is recommended that heavier cuts at slow speeds are preferable to light cuts at high speeds because of possible surface work-hardening. With increases in chromium, the hardness increases because of chromium carbide precipitation and machinability suffers. The higher the hardness of the austenitic iron, the greater the difficulty in machinability.

7. *Weldability.* Austenitic cast irons are reported as readily weldable by rod of the same composition by either the gas or electric welding processes. Monel metal rods also may be used satisfactorily for welding austenitic irons.

8. *Shrink Fitting.* In order to secure a shrink fit of austenitic iron, it is necessary to reduce the temperature to a very low point. A case is stated in which liners were cooled in liquid oxygen to -183°C. and in another to -79°C. in solid carbon dioxide.

9. *Heat and Corrosion Resistance.* Comparisons of the heat and corrosion resistance of austenitic irons with plain cast irons and steels of the stainless type are next discussed. Most of this information in this section is given in the 1940 edition of the *Cast Metals Handbook.*

10. *Thermal Expansion.* Expansion of austenitic irons is said to be constant up to 1000°C. and the value of coefficient is $18x10^{-6}$.

11. *Thermal Conductivity.* The thermal conductivity of austenitic cast iron is said to be lower than that of plain gray cast iron. In austenitic iron, the thermal conductivity falls slightly but uniformly as the temperature rises. For plain cast iron, the value varies between 0.110 and 0.137 C.G.S. units (calories per square centimeter per second per centimeter thickness per deg. C. difference in temperature). The value for two austenitic irons discussed is 0.07 and 0.08 respectively C.G.S. units at 100°C.

12. *Magnetic Properties.* Austenitic cast irons, being almost non-magnetic, have a low magnetic permeability as compared with ordinary cast irons.

13. *Electrical Properties.* The electrical resistance of austenitic cast irons is about 50 per cent greater than that of ordinary cast irons.

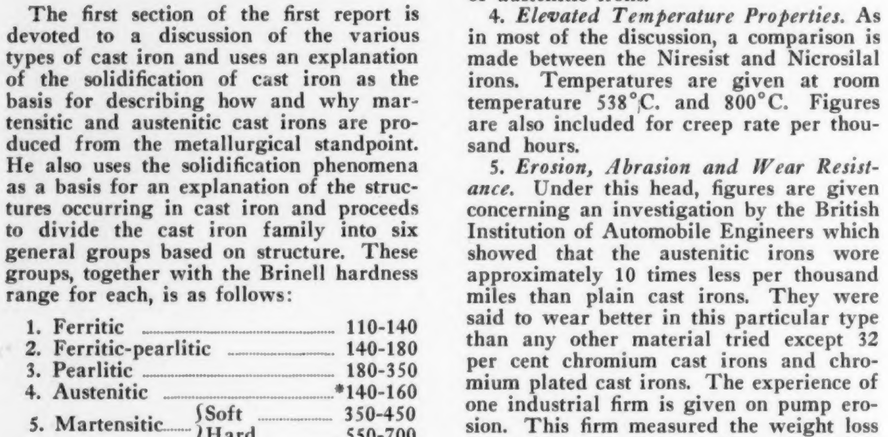
An appendix is given to this section showing the engineering applications of austenitic cast iron.

Martensitic Irons

The third section of the report deals with martensitic cast irons. The first part of this report deals with methods of obtaining these irons, with a description of a typical one containing essentially about 4.5 per cent nickel and 1.5 per cent chromium, the other elements resembling those used in chill cast iron. Irons of this class are used mainly in applications where resistence to wear, erosion or abrasion are necessary.

Mechanical Properties. A typical martensitic cast iron compared with a plain chill cast iron or a plain cast iron are given. This comparison is made in discussion of transverse and tensile strengths and impact and shock resistance of irons containing small amounts of martensite which is said to be quite good, but the resistance decreased with an increase in martensite. Martensitic irons are harder than ordinary chill cast iron. Martensitic cast irons containing moderate amounts of martensite can be machined successfully, using special equipment, but they are unmachinable with higher amounts of the constituent.

These irons are also subjected to heat treatment (oil quenching from 750°C.), which raises the hardness from about 488



to between 700 and 800. Higher quenching temperatures soften the material.

Martensitic irons can be used as welding material for hard facing. Irons of this type have 6 and 8 times the abrasion resistance of ordinary unalloyed white cast iron. The physical properties of martensitic cast iron have not been fully investigated and little information is available.

Appended to this third section of the report is a list of engineering applications of martensitic cast iron.

Phosphorus in Cast Irons

The second report deals with phosphoric high-duty irons. In the introduction of this report, it is explained that the most abundant iron ores in the United Kingdom are phosphoric. The phosphorus percentage in pig iron made from these ores is about 1.8 per cent and for cast iron about 1.4 per cent. Since phosphoric irons are comparatively easily melted and poured, they are used extensively in the United Kingdom for the lowest cost and commonest castings.

Following the introduction dealing with the abundance of phosphoric iron ores, the report discusses the effect of phosphorus on the structure of cast irons and the mechanical properties. This report gives the table in connection with the discussion of carbon and silicon control in phosphoric irons which explains the variation in carbon necessary with the given percentage of silicon to offset an increase in the amount of phosphorus. This table is reproduced here.

TABLE 1. COMPOSITION LIMITS FOR ADEQUATE STRENGTH AND SOUNDNESS IN PHOSPHORIC CAST IRONS

1	2	3	4
For grey cast irons of		Maximum percentage of total carbon for reasonable strength should not exceed	For soundness, the total carbon content given in col. 3 is adequate unless reduced as indicated below
Silicon, per cent	Phosphorus, per cent		
Below 1·5	0·3	3·6	—
	0·6	3·5	—
	0·9	3·4	—
	1·2	3·3	—
1·5	0·3	3·5	—
	0·6	3·4	—
	0·9	3·3	—
	1·2	3·2	—
2·0	0·3	3·3	—
	0·6	3·2	—
	0·9	3·1	—
	1·2	3·0	—
2·5	0·3	3·2	—
	0·6	3·1	2·9
	0·9	3·0	2·9
	1·2	2·9	—
3·0	0·3	3·0	—
	0·6	2·9	2·7
	0·9	2·8	2·7
	1·2	2·7	—

In relation to physical properties, it is stated that the ultimate tensile stress may be expected to improve from 2.5 to 5 per cent for each 0.1 per cent of phosphorus up to 0.35 per cent phosphorus and then to diminish at a similar rate. The ultimate transverse stress and the transverse deflection seem to vary from 2 to 4 per cent in the same manner as indicated above for the tensile stress.

Brinell hardness is claimed to rise about 4 points for 0.1 per cent increase in phosphorus. Impact or shock strength diminishes about 5 per cent for each 0.1 per cent increase of phosphorus. Effect of phosphorus on wear is said to vary, depending on the type of wear to which the casting is exposed. It is claimed that phosphorus has an effect on the drop in mechanical properties of cast iron on annealing. Iron containing 1 per cent phosphorus shows on dead annealing about one-half the drop in strength found in a low-phosphorus iron under similar treatment.

In regard to the effect of phosphorus on mechanical properties at elevated temperatures, phosphorus does not materially influence the liability to growth, but tends to slightly improve resistance to scaling. It is said that as the phosphorus content increases, the stiffness or rigidity of the metal increases when exposed to high temperatures.

Phosphorus also is claimed not to materially alter the thermal expansion of cast iron, but lowers the thermal conductivity about 0.5 per cent for each 0.1 per cent of phosphorus added. Phosphorus does not seem to materially effect the resistance of cast iron to acids.

See Steel, Hydrogen.

Copper

ANNEALING. *"Effect of Columbium on Some Annealing Characteristics of Copper and 80-20 Cupronickel,"* by A. U. Seybolt, *Metals Technology,* Technical Publication No. 1342, vol. 8, No. 5, August, 1941, pp. 1-5. In examination of some cold-rolled copper and cupronickel that contained a little columbium, it was discovered that these alloys were unusually resistant to annealing. The effect was sufficiently pronounced to warrant some investigation of the annealing characteristics of such compositions. The experimental procedure is explained and the results of the tests are shown. It was found that the addition of 0.58 per cent Cb with associated impurities raised the softening temperature of cold-rolled copper to about 450°C., compared to about 250°C. for pure copper. Also about 0.1 per cent Cb in copper is required to produce a noticeable effect in raising the softening temperature. The addition of 0.29 per cent Cb to 80-20 cupronickel raises the softening temperature of the cold-rolled alloy to about 600°C., compared with about 500°C. for the cupronickel without columbium. (Al.)

Furnaces

See Steel Melting, Open-Hearth.

Gating

See Mold, Construction.
See Non-Ferrous, Gates and Risers.

Heat Treatment

TROUBLE SHOOTING. *"Trouble Shooting,"* by R. C. Stewart, *Canadian Metals and Metallurgical Industries,* vol. 4, No. 7, July, 1941, pp. 168-170, 174. An interesting discussion on problems of heat treating parts and detecting causes of their failure. Numerous defects are presented herein that migh occur in many plants and deserves reading to see how investigations have remedied the situation. Such things as die movement, defect in blank and grain size are just a few of the items mentioned in this paper that causes trouble and are discussed. (H.T.)

See Aluminum Alloys, Heat Treating.
See Aluminum Alloys, Properties.
See Copper, Annealing.

Hygiene

DUST. *"Dust in Your Foundry,"* by J. E. Turner, *Safety Engineering,* vol. 82, No. 2, August, 1941, pp. 11-14. To perform a good housekeeping job in the foundry it is necessary to maintain proper aisles and clearances, pile material and equipment in a safe manner, keep tools and parts in their proper place, eliminate as much dust as possible at its source and organize for regular cleaning of the plant. The use of vacuum equipment is definitely recognized as the accepted and practical method of maintaining a clean plant, taking care of the dust nuisance, as an economy measure. Vacuum equipment can remove dust accumulations from walls and overhead structural work with ease. (Hy.)

SMALL PLANT. *"This Small Plant Knows the Answer,"* by P. E. Rentschler, *Occupational Hazards,* vol. 3, No. 11, August, 1941, pp. 10-13, 24-27. This article tells about the thoroughly and practical methods designed by the Hamilton Foundry & Machine Co., Hamilton, Ohio, to keep their men alert and efficiently on the job. The safety and hygiene program was kept after from the time the slogan "Safety begins at the top" was adopted until it covered the bottom with the safety shoe problem. The early work of this program consisted of physical examinations for all employees, including chest X-rays and blood tests. Interesting experiences with Ohio and Indiana insurance rates are related. The author explains how the safety and hygiene campaign was planned, how a safety committee was organized, its personnel and when meetings were held. (Hy.)

Magnesium

AIRCRAFT CASTINGS. *"Magnesium Aircraft Castings,"* by W. A. Phair, *The Iron Age,* vol. 148, No. 8, August 21, 1941, pp. 39-43. The new magnesium foundry of the Wright Aeronautical Corp. produces engine nose sections, oil sumps, super-charger front and rear sections and numerous other items. Fluxes play an important role in the prevention of fires as also does rigid control in melting and pouring operations. Three fluxes are used, two for melting and one for remelting. Melting equipment consists of 48 oil-fired furnaces, of which 28 are 100-lb. crucible furnaces, 14 are 500-lb. holding units for clean scrap and 6 are 500-lb. furnaces for remelting dirty scrap. Charges in the furnace are heated to 1600°F., but the metal is poured at 1450°F. One of the chief features of the plant is the extremely close control exercised over all phases of sand preparation and the 100 per cent reclamation of used molding sand. Chills are all of cast iron and before being used are sprayed with a mixture consisting of paraffin wax dissolved in carbon tetrachloride. Two types of core and sand mixtures are used, one for body cores and one for softer interior cores which must collapse. These two types are commented on in detail. Magnesium dust, if not handled properly, is as much a hazard as molten metal itself. At the Wright plant they prevent excessive accumulation of dry dust by keeping all exhaust pipes clean and wetting the dust as soon as it hits the accumulators. (Al.)

ALLOYS. *"Preferred Orientation in Rolled Magnesium and Magnesium Alloys,"* by P. W. Bakarian, *Metals Technology,* Technical Publication No. 1355, vol. 8, No. 5, August, 1941, pp. 1-6. Previous determinations of the texture of magnesium and its alloys have shown only slight variations in the principal features of the structure. This investigation presents pole figures for magnesium and two of its alloys, in which differences of some mag-

nitude are shown. An improved method for plotting pole figures having quantitative intensity fields is presented. Pole figures for high-purity magnesium and two magnesium-rich alloys have been determined. The significance of the intensity evaluations of pole figures in determining directional properties is discussed. The existing textures are rationalized on the basis of single-crystal behavior. (Al.)

Metallography

ETCHING. *"Etching Technique,"* by M. G. Corson, *The Iron Age*, vol. 148, No. 8, August 21, 1941, pp. 45-51. The author has submitted a number of interesting observations based on many years' work. He has set down the theory of etching, and has presented informative data on the application of neutral ferric chloride solutions to the etching of nickel and its alloys. The author comments on the prerequisites of a good etchant; three types of etchants, which include those where the etching effect is due primarily to their content of hydrogen ions, those where the etching depends upon the hydroxyl ion and reagents producing a differential staining effect, the chemical nature of which is still obscure; and a logical choice of the etchant. (Te.)

ETCHING. *"Etching Technique,"* by M. G. Corson, *The Iron Age*, vol. 148, No. 9, August 28, 1941, pp. 45-49. A continued article containing a discussion of the theory of etching and the application of neutral ferric chloride solutions to the etching of nickel and its alloys. In this section attention is directed to using the same solution for copper alloys and iron-silicon alloys; also certain "strange structures" are noted, structures that do not exactly conform to the ideas prevalent among metallographers and are called "mere etching effects." A full page of these micrographs is shown with this article revealing some of the structures. (Te.)

ETCHING. *"Etching Technique,"* by M. G. Corson, *The Iron Age*, vol. 148, No. 10, September 4, 1941, pp. 56-61. The author concludes his article with data on permanent and non-permanent solid solutions, and discusses additional strange metal structures. He also comments on the binary, ternary and quaternary alloys as alpha alloy combinations which possess that feature of instability resulting in most cases to the capacity for heat-hardening. (S.)

EXAMINATION. *"Metallographic Examination Standardized,"* by C. M. Cosman, *The Iron Age*, vol. 148, No. 5, July 31, 1941, pp. 38-43, 96. A continued discussion of a method devised in Germany to reduce all the relevant metallographic information about steel to a series of numbers. This concluding installment gives information on classifying inclusions, carbide segregation, other structual phenomena and surface condition. (Te.)

See Cast Iron, Graphite Structure.

Mold

CONSTRUCTION. *"Mold Construction and Tackle,"* by E. Longden, *Iron and Steel* (London), vol. 14, No. 12, July, 1941, pp. 383-385. The choice of gates should be decided according to location, capacity for distribution and the filling of the mold at, as far as possible, a temperature which does not vary too much when brought to rest in all parts of the mold, and the subsequent effect of fluid shrinkage and solid contraction. Scabbing of the mold may more easily be prevented when pouring through a heavy section, cleanliness may be obtained at the expense of a shrinkage cavity or porosity in the heavy section which is already overburdened with heat. The choice of top or bottom pouring of castings is arbitrary, but when pouring green sand castings of a depth beyond 6-in., it is necessary to admit the metal at a low point in the mold. The shape of gates is commented upon and the author states that round gates of the same area as rectangular ones will admit metal to a mold more quickly because there is less surface area. Rates of pouring depend on each particular mold; some needing to be filled quickly, others slowly. The author discusses sand reinforcements such as lifters, gaggers and grids; various extra devices and molding box details. (Mo.)

Non-Ferrous

GATES AND RISERS. *"Gates and Risers,"* by W. B. George, *Foundry Trade Journal*, vol. 65, No. 1300, July 17, 1941, pp. 42-43, 41. There is no limit to the material which can be written about gates and risers, and this paper is only meant to lay down the fundamentals for a better understanding of the directional solidification that is required for the making of sound castings in tin, bronzes and red brasses. A full page of illustrations shows the various uses of gates and risers. (N.F.)

TEST BARS. *"Making Non-Ferrous Test Bars,"* by N. K. B. Patch, *The Foundry*, vol. 69, No. 8, August, 1941, pp. 65, 124-126. A separately cast test bar may be standardized in shape, location of riser, method of gating and other factors so that it becomes representative of the metal when cast under standard conditions. The bars are located so that half the bar is in the drag and the other half in the cope above which is the riser extending the entire length of the bar and connected to the bar by a fin gate which runs the entire length of the bar and is about $\frac{5}{16}$-in. thick. Where this method is adopted it is well to be sure that the riser is slightly above the level of the bar. In the production of the higher strength compositions, like aluminum bronze, manganese bronze and others, many foundries prefer to have several bars cast for convenience sake. The necessity for three bars, one for the government, the manufacturer and an umpire bar, can be seen. The bars must be sawed from the shrinkage head and therefore machined to the desired size of a standard test coupon. Another type of bar which is received favorably is the keel block bar. This bar is made up of heavy shrink head on either side of which is cast a bar which may be sawed off and at the bottom of which is another bar to be sawed off for test. Those bars, if conditions are maintained correctly or properly fed should be uniformly accurate as to the characteristic of the metal cast in that riser. In gating the standard test bars the gates should be of such size as to produce a free flow of metal. It frequently is demanded that the test bars must be attached to the casting so that the inspector may see that the bar was cast from the same pot of metal used to pour the casting. (N.F.)

See Aluminum Alloys, Heat Treating.
See Aluminum Alloys, Properties.
See Copper, Annealing.
See Magnesium, Aircraft Castings.
See Magnesium, Alloys.
See Phosphor-Bronze, Alloys.

Phosphor-Bronze

ALLOYS. *"The Physical Properties and Annealing Characteristics of Standard Phosphor-Bronze Alloys,"* by Maurice Cook and W. G. Tallis, *The Journal, Institute of Metals* (London), No. 892, pp. 49-65. A detailed study has been made of the effect of progressively increasing amounts of cold work on the hardness and mechanical properties of seven phosphor-bronze alloys in strip form, as well as of their annealing characteristics. In order to obtain information regarding the effect of varying tin and phosphorus contents, alloys were made up to cover combinations of the highest and lowest phosphorus and tin contents allowed by the latest (1939) revision of British Standard Specification No. 407 for phosphor-bronze sheets, strip, and foil, and in addition three average compositions were made up for the three grades of alloy recognized by the specification. Data also have been obtained on the density, thermal expansion, and thermal and electrical conductivity of the alloys. (Al.)

Pig Iron

DESULPHURIZATION. *"Recent European Developments in Pig-Iron Manufacture,"* by N. L. Evans, *Foundry Trade Journal*, vol. 64, No. 1273, January 9, 1941, pp. 19-22. Slags of low melting point may have a lower capacity for carrying sulphur than high lime slags of common practice, and in the manufacture of basic pig-iron it is, in general, essential that the liquid iron shall be desulphurized after tapping the metal from the blast furnace. One method which is capable of application to a very wide range of pig-irons is by treatment with sodium carbonate in a ladle, after the iron is tapped from the furnace. The first major continental development employing sodium-carbonate treatment was the "O.M". (*ohne mangan* or manganese-free) process; the manufacture of pig-iron without additions of manganese ore to the blast-furnace burden. There were certain technical reasons which favored the "O.M." process. Manganese is less easily reducible than iron in the blast furnace, and a considerable proportion of the amount charged with the burden is lost in the slag. To minimize the proportion of the manganese oxide which is lost, additional limestone has to be used. In the Luxemberg experiments the iron was desulphurized in a ladle by treatment with sodium carbonate. This reagent is placed into the bottom of the ladle, and the iron tapped on to it, special precautions being taken to prevent any siliceous slag becoming mixed with the soda slag. The treatment was carried out after the iron left the mixer from which it was poured into a ladle. Sodium carbonate improved the product. The average decrease in the sulphur content was 38 per cent; residual manganese in the iron was 0.08 per cent as compared with 0.20 per cent when the blast furnace was operated with manganese additions. It has been shown that sodium carbonate treatment of basic-Bessemer cast iron improves its temperature and fluidity. Fluidity tests prove that, with all other conditions remaining constant, treated iron is much more fluid than untreated. An important practical effect attributed to this greater fluidity is that desulphurized iron can be blown in the basic Bessemer in 3 to 5 minutes less than untreated iron. The Volklingen process in Germany employs sodium carbon-

ate in a molten form for desulphurization instead of in the solid form. Sodium carbonate is melted, and when required for use, it is tapped into an unlined ladle which has been preheated. When filled, the ladle is carried along on a monorail and the soda poured through a tun-dish into the stream of iron in the blast-furnace runner and thence into the hot-metal ladle, which is lined with fire brick containing 32 per cent alumina. By the use of molten sodium carbonate in the proportion of 1 per cent of the weight of metal, the sulphur content of the iron is reduced to 0.04 per cent. (Ir.)

Piston Rings

GRAY IRON. *"Why Gray Iron Piston Rings for Aircraft Engines?"* by Paul Lane, *The Foundry,* vol. 69, No. 8, August, 1941, pp. 50-53, 112-113. Why do we find cast iron still in general use for the piston rings when stronger steel base materials would seem available? First the physical properties of piston ring iron are very different from those indicated by the chemical specifications for such material. Rings made from this analysis: silicon, 2.10 to 3.10; sulphur, under 0.10; phosphorus, 0.30 to 0.80; manganese, 0.40 to 0.80; graphitic carbon, 2.70 to 3.20; and combined carbon, 0.45 to 0.75; test 45,000 to 50,000 lb. per sq. in. when the ring itself is used as a tensile bar. Its "spring" qualities, as would be expected from its modulus values—15,000,000 lb. per sq. in. is another admirable quality. Wear characteristics of gray cast iron account more than anything else for its continued application for rings. The author elaborates on the wear problem of piston rings and explains though poor-wearing on a weight-loss basis, they do have the significant and desirable faculty of wearing away with very little tendency to accumulate wear products on their rubbing surface. Costly excessive piston groove wear is held to a minimum. The structural and physical properties of cast iron resist to a marked degree the peening and setting actions of the cylinder and the ring moving from top to bottom of its groove with piston reciprocation. Though gray iron lacks the toughness and high strength of other ferrous alloys, it nevertheless possesses certain properties peculiar to itself which seem well adapted for piston ring requirements. (G.I.)

Risers

See Non-Ferrous, Gates and Risers.

Rubber Molds

CASTING. *"Casting in Rubber Molds,"* by F. K. Smith, *Steel,* vol. 109, No. 1, July 7, 1941, pp. 50-51, 78, 80. A new method of casting low melting point alloys permits excellent reproduction of undercuts — something formerly thought impossible to cast. Rubber molds also produce fine detail in most intricate shapes without distortion. Method cuts cost of typical mold from $125 to less than $5, shortening time for making the mold from former period of one to two weeks down to a few hours. Molds last 600 pours, casting at 550° F., producing 150 parts per hour. Casting speed about 25 pours an hour. One operator easily handles two machines. Herein are some of the latest recommendations on design of molds and their application. (C.)

Sand

CONTROL. *"Some Fundamental Aspects of Foundry Sand,"* by E. J. Ash and Erik O. Lissell, *The Foundry,* vol. 69, No. 7, July, 1941, pp. 60-61, 118-120. This paper deals with experiments to determine the effect of water on washed sand grains, both round and angular, with regard to permeability, density and flowability. It is an investigation attempting to clarfy apparent deficiencies of the A.F.A. compression test method through a study of factors which influence the ramming process, and to better understand its advantages and limitations. After testing and using the A.F.A. method of preparing test specimens it was found that round sand grains are more flowable than angular grains; round sand grains are more dense, when rammed, than angular sand grains; angular grains have greater intergranular space when rammed; and angular grains have higher permeability than round grains. (Sa.)

CONTROL. *"Some Fundamental Aspects of Foundry Sand,"* by E. J. Ash and Erik O. Lissell, *The Foundry,* vol. 69, No. 8, August, 1941, pp. 60-61, 130-131. It has been said that water greatly changes the frictional resistance of grains at high moisture contents. This is not true, state the authors. As the water content is increased, it tries to surround the individual grains with a water film. The film grows thicker and stronger, and increases the friction between grains until a critical film thickness is reached. Any increase in water content above that critical amount of water has no influence on friction. Between the range of 2 to 12 per cent, water variation has no effect on intergranular void volume, dry permeability and flowability. In a relatively low moisture range (about 0.5 to 2.5 per cent for round and 0.5 per cent for angular grains), the green permeability exceeds the dry permeability values. (Sa.)

FRENCH VIEWS. *"French Views on Molding Sands," Foundry Trade Journal,* vol. 64, No. 1276, January 30, 1941, pp. 71-73. Instruments in daily use which determine the bond, permeability, moisture, crushing strength and other properties of sands, are essential to the foundryman who wishes to work along the best lines. However, sufficient attention is not given to the original state of the sands before using them and when they come to the foundry in the natural state. With rare exceptions new sand is seldom used in the foundry; the new sand is usually added in variable proportions to sand which has already been used, and these mixtures receive a treatment before being employed. This article helps solve these three statements: determine the necessary mixtures required for a particular product, as much from the point of view of the composition of these mixtures as of the method of preparation; establish a control to ensure the regular nature of the sands to be supplied for the preparation of these mixtures and establish a control of the prepared mixtures, in order to ensure regularity of the molding operation and the consistence of their properties. This takes into consideration compressive strength, preparation of sand, effect of drying and milling, permeability and water control, time factors, control of new sand and control of prepared sand in the discussion of how to solve the three statements listed above. (Sa.)

Steel

BOMBS. *"Producing Cast Steel Bombs at Sculling Steel," The Foundry,* vol. 69, No. 8, August, 1941, pp. 56-59. A pictorial story of the production of steel bombs from pattern shop to cleaning room. Pictures show to what extent the pattern shop inspects and repairs damage done to patterns during the day's run; how bomb casings are made on a jolt-rollover molding machine; the inspection of cores after being placed in the mold; care taken by the ladle men in pouring; removal of gates and risers; grinding and chipping operation and testing procedure. (S.)

CASTINGS. *"Electric Steel Castings Meet Defense Requirements,"* by R. R. West, *The Foundry,* vol. 69, No. 5, May, 1941, pp. 84-87, 177. This particular steel concern uses the full boil process on acid practice for electric steel melting, carrying with that the double slag. The author outlines his charging practice and what material constitutes his melt. A brief description is given of the melting practice emphasizing the full boil process. All work done in the shop is bottom poured. A table gives some idea of the operation of one of the furnaces which shows a heat is tapped about every hour. Special emphasis is placed on government work to help other foundrymen manufacture steel castings that meet government specifications. (S.)

CHEMICAL ANALYSIS. *"Determination of Tin in Cast Iron and Plain Steel,"* by E. T. Saxer and R. E. Minto, *Steel,* vol. 109, No. 3, July 21, 1941, pp. 66, 91-95. Determining the percentage of tin in iron and steel in a minimum of time has been made possible by an imposed method which affords a sharp and lasting end point. The method makes use of an alloy of iron and antimony designated "Stanreduce" which supplies its own reducing atmosphere. The method is outlined in detail along with various solutions used. (S.)

HEAT TREATMENT. *"Heat Treatment of Steel Castings,"* by John Howe Hall, *Metals and Alloys,* vol. 13, No. 5, May, 1941, pp. 563-569. The evolution of the heat treatment of steel castings from the practice of the early days to the present time is discussed. Some interesting facts on old time heat treating are presented by the author when some strange practices in annealing and heat treatment were carried on. It was once thought that if a casting was "red" when it came out of an annealer it was satisfactorily "heat treated"—no attention was paid to the fracture. Other castings were pronounced "annealed" if they were allowed to rust over night in the dampness. This story is most interestingly told and makes worthy reading. (S.)

HYDROGEN. *"Hydrogen in Steel and Cast Iron—III,"* by C. A. Zapffe and C. E. Sims, *Metals and Alloys,* vol. 13, No. 6, June, 1941, pp. 737-742. The third installment continues the discussion of the effect of hydrogen in certain steel and cast iron parts on defects in applied coatings. The effect of surface and thickness of metal on hydrogen absorption at ordinary temperatures during acid pickling along with the effect of temperature and concentration of both hydrochloric and sulphuric acids is discussed. The authors also give information on inhibitors, cathodic electrolysis, effect of current density, "promoters" and rusting. The second section of the article deals with hydrogen effusion at ordinary temperatures in which defects in electroplate and vitreous enamel is studied. (S.)

HYDROGEN. *"Hydrogen in Steel and Cast Iron,"* by C. A. Zapffe and C. E. Sims, *Metals and Alloys,* vol. 14, No. 1, July, 1941, pp. 56-60. Effusion of hydrogen from steel during electroplating may cause "gas pits"; and effusion after plating may cause blistering and lifting. Paint and resinous coatings on steel are affected much as is electroplate by hydrogen effusion, and the defects are significant because they may incept corrosion. De-scaling by acid pickling or cathodic electrolysis is in part effected by the explosive action of hydrogen that enters the metal at bared areas, diffuses through the metal and reappears underneath scale or coating, where the partial pressure of atomic hydrogen is a minimum. (S.)

HYDROGEN. *"Hydrogen Embrittlement, Internal Stress and Defects in Steel,"* by C. A. Zapffee and C. E. Sims, *Metals Technology,* Technical Publication No. 1307, vol. 8, No. 5, August, 1941, pp. 1-35. The concept of "block" structure in steel is discussed and the proposal is made that hydrogen embrittlement is the phenomenon of occlusion of hydrogen under high pressure in "interblock disjunctions." These disjunctions appear to be a fundamental part of crystal structure and are related to slip and cleavage phenomena. When the occlusion pressure exceeds the elastic strength of the steel, the disjunctions are sprung and slip and cleavage planes operate much as during cold deformation. Hydrogen embrittlement, if caused by aerostatic pressures within the substructure, or the cleavage structure, of steel, must have the nature or triaxial stress and will therefore inhibit flow, so that an imposed stress may lead to rupture. "Snow flakes," "white spots," and such defects that do not necessarily exhibit fissuring are shown to be hydrogen embrittlement that is localized about some discontinuity, such as interdendritic interstice, inclusion or blowhole. "Flakes" and "shatter cracks," which are fissures, are shown to be similar hydrogen-embrittled zones that are subsequently ruptured by imposed stress. "Checks" or "tears" on the surface of tensile specimens may be caused by hydrogen embrittlement just as are "flakes" except that the imposed stress causing "tears" is specifically from tensile testing. The mechanism of these defects and their interrelationships are discussed and illustrated by experiment. Recovery from hydrogen embrittlement upon annealing is investigated both for mild steel and for weld metal. Optimum annealing treatments for improving ductility are suggested, and re-solution of hydrogen from rift-to-lattice at elevated temperature is demonstrated to explain the puzzling recurrence of hydrogen caused defects in steel from which hydrogen had apparently been removed. (S.)

IMPACT STRENGTH. *"Some Complexities of Impact Strength,"* by A. V. De Forest, *Metals Technology,* Technical Publication No. 1341, vol. 8, No. 5, August, 1941, pp. 1-17. This paper was presented as the eighteenth annual Howe Memorial Lecture at the February meeting of the American Institute of Mining and Metallurgical Engineers. Many unknown variables are involved in fatitgue strength, but at least the problem of impact strength has been defined, herein are described methods of test and such variables as surface conditions, speed, temperature, corrosive enviroment, size and notch effect, as modifying a basic endurance limit, are clearly recognized and discussed. Impact strength of a structure is a complicated summation of many factors, which seldom may be sufficiently separated to permit of independent study. The difficulties of such an analysis are here presented in the hope that recent developments in instrumentation will be usefully applied in this field. (S.)

INSPECTION. *"Inspection of Steel,"* by H. B. Pulsifer, *Metal Progress,* vol. 40, No. 1, July, 1941, pp. 52-56. The first and most important step in testing is to obtain a suitable sample and forward it to the proper laboratory. Since returns from the chemical laboratory might take hours or days there are a variety of rapid qualitative tests that can be used to identify the material. These include the bond test, hardness for quenching, the spark test, tool tests, scale characteristics, magnetic response, spot test for nickel, solution rate and acid attack sulphur prints, spectroscope lines, differential quenches and micro patterns of etched sections. These tests are commented on and described in detail. (S.)

LOW CARBON. *"Some Effects of Titanium on Low Carbon 1 Per Cent Chromium Steel,"* by J. N. Pappas and M. Cohen, *The Iron Age,* vol. 148, No. 5, July 31, 1941, pp. 29-34. In a paper by Comstock the presence of small amounts of titanium in forged pearlitic manganese steels improved the ductility and impact resistance without sacrificing the high strength characteristics induced by the manganese. It was decided to investigate the effects of titanium on the mechanical properties of a 1 per cent chromium steel containing 0.20 per cent carbon. Vanadium is used in chromium steel to enhance ductility and impact properties, and in view of the analogous carbide and oxide-forming tendencies of vanadium and titanium, it was deemed advisable to ascertain the relative effects of these two elements in this chromium steel. It was found that the addition of aluminum, titanium and vanadium to a 1 per cent chromium steel containing 0.20 per cent carbon raises the coarsening temperature. The addition of titanium to this type steel lowered the strength properties and raises the ductility and impact properties. Titanium produced a better combination of properties than is obtained by aluminum deoxidation alone. Titanium has specific alloying action. Aluminum and titanium inhibit air-hardening in these steels after normalizing at temperatures up to 1850°F. Vanadium alone raises the air-hardenability after normalizing at 1850° or above. In the pseudo-carburized and heat treated steels, as well as in the quenched and tempered steels, titanium contents between 0.025 and 0.25 per cent produce a wide range of mechanical properties. Lower titanium steels exhibited high strength with moderate ductility and impact resistance, while higher titanium showed moderate strength with high ductility and impact resistance. The combined use of aluminum and titanium may be advantageous in attaining a given set of properties with less titanium than would be required in the absence of aluminum. The hardened vanadium-bearing steels showed greater ability to retain their strength after tempering than the non-vanadium steels. (S.)

LOW COST. *"The Manufacture of High-Quality, Low Cost Steel,"* by P. J. McKimm, *Steel,* vol. 109, No. 6, August 11, 1941, pp. 87, 90, 106. In the manufacture of steel the first and fundamental consideration should be economy and this necessarily begins with the design of open-hearth furnaces, plant layout and all auxiliary equipment; track layout for incoming raw materials, and for outgoing products. All factors involved in steelmaking should be planned so that the most economical raw materials can be employed to maintain the highest quality, low-cost steels. A discussion of the Bosshardt furnace reveals it has extremely high built-up air uptakes at each corner of the furnace, extremely high slope of the ports, complicated arrangement and layout of the four gas ports and that a gas producer is connected to the furnace at each port end and their interconnection. Several grades of stainless steels are produced in this type furnace. Furnace capacity is of little consideration other than to obtain the lowest conversion cost for the greatest tonnage per furnace hour regardless of whether the furnace is operated with a deep bath or a shallow bath. The author states the most economical open-hearth is between 150 and 175 tons per heat and which affords a high tonnage per furnace hour operation. A discussion on furnace bottoms also is presented. Comment is made on care and maintenance, melting time and important factors to remember in charging technique. (S.)

OPEN-HEARTH TESTS. *"Rapid Tests for Control of Open-Hearth Steel-Making Practices,"* by B. F. Courtright, *Industrial Heating,* vol. 8, No. 8, August, 1941, pp. 862, 864. Rapid methods for the control of open-hearth furnace practice may be divided into two classifications: those employed by the melter or other operator at the furnace, and those which require the services of the chemical laboratory. The one method available to the melter was the "fracture test" but now they depend on carbometers to check on carbon control. Many methods have been devised for rapidly estimating the chemical composition and physical condition of the slag, such as Herty's viscosimeter and the "slag pancake" method. The description of the latter method is discussed in detail. (S.)

PRODUCTION. *"The Production of Steel Castings,"* by C. H. Kain, *Foundry Trade Journal,* vol. 64, No. 1296, June 19, 1941, pp. 411-412. This paper is intended to be a general description of carbon steel castings and, this section concerns itself with general considerations; preparation of liquid steel, using the crucible, high-frequency, converter, and open-hearth processes. The electrode furnace and refractories are briefly discussed. (S.)

SCIENCE. *"Steel Castings Production Aided by Science,"* by E. C. Troy, *The Foundry,* vol. 69, No. 6, June, 1941, pp. 46-49, 131. This is but a brief explanation of the adaptability of science to the industry. The application of science to the control of many variables which at one time were handled by the rule of thumb is now routine from choice of raw materials entering to uniformity of product leaving the foundry. The author explains what science is doing to aid in the care and maintenance of molding sand; what effect chemistry has had on furnace melting; how new melting methods have been developed; and information on other departments that science has helped grow and develop. (S.)

Steel Melting

OPEN-HEARTH. *"Basic Open-Hearth,"* by J. H. Chesters, *The Iron Age,* vol. 148, No. 6, August 7, 1941, pp. 37-40. The data herein deals mainly with the refractories used in the hearth and in the checkers. This section of the paper deals with the hearth, its construction, materials and life and causes of failure. Tables in this article give properties of basic open-hearth furnace bottom bricks and grading and chemical analysis of typical fettling

materials for basic open-hearth furnace bottoms. (S.)

OPEN-HEARTH. *"Basic Open-Hearth,"* by J. H. Chesters, *The Iron Age,* vol. 148, No. 7, August 14, 1941, pp. 39-41. This section of the paper gives information on those refractories employed in the construction of the gas and air up-takes, slag pockets and valves. In general these parts are constructed of silica or fireclay brick, but the particular quality used depends upon the severity of the working conditions. The author discusses construction, materials and life and causes of failure of gas and air up-takes and construction, materials, life and causes of failure and lines of improvement for gas, air slag pockets. (S.)

OPEN-HEARTH. *"Basic Open-Hearth,"* by J. H. Chesters, *The Iron Age,* vol. 148, No. 8, August 21, 1941, pp. 52-58. The last of this series of three articles on refractories used below the sill plate level discusses the construction, materials, causes of failure, and lines of improvements in checkers, checker chambers, gas and air valves, and flues. In general all these parts (with the exception of the hearth) are constructed of silica or fireclay brick, but the particular quality used depends upon the severity of the working conditions. For the bottom of the checkers medium alumina fireclay brick is adequate, but at the top of the checkers, where the temperature is higher, silica brick or high alumina fireclay brick is employed. (S.)

Testing

WEAR RESISTANCE. *"Wear, and What Can Be Done About It,"* by G. T. Williams, *Metal Progress,* vol. 40, No. 1, July, 1941, pp. 63-66. Wear is the thing that causes most machines and parts to be scrapped. Of all types of wear-abrasion—the grinding away of the metal surface is most important. High hardness plus high carbon will ordinarily give the best resistance to abrasion in tool and die steels. In the study of wear testing, on both machines and specialized tests, it has been found that surface finish is a major factor in prolonging life and wear. In some cases extreme smoothness in a gas engine cylinder will cause excessive "blow-by" and large oil consumption for a long breaking-in period. Another kind of damage causing loss of dimension is called scoring. High finish is helpful in reducing scoring and lubrication is an important item also. Galling along with scoring can be stopped with lubrication and surface finish. If galling is severe to stop the motion of the moving part seizure has been set up. Pitting is another failure but can be avoided by good mechanical production, avoiding high spots, poor contact between teeth and poor rigidity of the assembly. Chipping, a brittle failure, can be remedied by lower Brinell. Flow is a form of defect that occurs when a poor mesh or contact of gear teeth might cause a small portion of the tooth face of a soft gear to flow aside. Corrosion is the last defect discussed by the author and states that corrosion is the producer of notches by water corrosion (rusting) and are just as bad as notches that are produced by a machinist. (Te.)

See Non-Ferrous, Test Bars.
See Sand, Control.
See Steel, Inspection.
See Steel, Open-Hearth Tests.
See X-Ray, Deformation.

X-Ray

ANALYSIS. *"X-Ray Analysis in Industry,"* by W. L. Bragg, *Journal of Scientific Instruments,* vol. 18, No. 5, May, 1941, p. 69. The papers on the application of X-ray analysis to technical problems represent an attempt to meet a widely expressed desire for closer collaboration and sharing of experience between those research workers in industry and the universities who are interested in this subject. X-ray analysis is carried out in many laboratories in this country, and the various groups of workers have developed improved methods and discovered new applications. The papers herein do not deal with the highly specialized art of crystal analysis. They deal with the many other characteristics of the solid state which can be determined by X-ray analysis. There is the identification of the crystalline constituents of a sample. Each crystalline solid gives a characteristic diffraction pattern, and can be recognized by spectral analysis. Extremely small samples measured in fractions of a milligram are sufficient, and the constituents are determined without destruction of the specimen. Applications are found in the structure of alloys, identification of intermediate products in chemical processes, and of allotropic changes in refractories. A new field, that of the submicroscopic structures within each individual crystal, such as occur in age-hardening and other types of imperfect phase precipitation in the solid state. (Te.)

October Chapter Meeting Schedule

October 3
Western New York
Hotel Touraine, Buffalo
FRANK REDMOND
"How Do We Get That Way?"

October 6
Metropolitan
Essex House, Newark, N. J.
E. W. HORLEBEIN, Gibson & Kirk Co., Baltimore, Md.
"Meeting New Problems in Non-Ferrous Jobbing Foundries"

Western Michigan
Occidental Hotel, Muskegon
R. G. MCELWEE, Vanadium Corp., Detroit, Mich.
"Making the Most of What Is Available"

Central Indiana
Washington Hotel, Indianapolis
PAT DWYER, "The Foundry," Cleveland, Ohio
"Gates and Risers for Castings"

October 8
New England Foundrymen's Association
Engineers Club, Boston
CHARLES SCHUREMAN
F. E. Schundler & Co.
"Synthetic Molding Sands—Problems and Solutions"

October 9
Northeastern Ohio
Cleveland Club, Cleveland
MAX KUNIANSKY
Lynchburg Foundry Co.
"Gray Iron Founding Operation"

St. Louis District
De Soto Hotel, St. Louis
LT. COL. W. CARTER BLISS
Office of Production Management
"Relation of OPM to the Foundry Industry"

October 10
Philadelphia
Engineers Club, Philadelphia
NORMAN MOCHEL
Westinghouse Elec. & Mfg. Co.
"Present and Future Trends of Specifications"

Northern California
Sequoyah Country Club, Oakland, Calif.
Outing

Central New York
Elmira, N. Y.
D. J. REESE, International Nickel Co., New York, N. Y.
"Practical Cupola Operation"

October 14
Cincinnati District
Shuller's Restaurant
Cincinnati, Ohio

Northern Illinois-Southern Wisconsin
Hotel Hilton, Beloit, Wis.
R. C. KESKLE, Link-Belt Co., Chicago
"The Foundry Foreman's Responsibility in Making Personnel Work Effective"

October 17-18
Chicago, Michiana and Central Indiana
Regional Conference

October 17
Birmingham
Tutwiler Hotel, Birmingham, Ala.
CAPT. J. E. GETZEN, U. S. A. Ordnance Dept.
"The Foundry's Place in National Defense"

October 20
Quad City
Fort Armstrong Hotel, Rock Island
W. A. HAMBLEY
Allis-Chalmers Mfg. Co.
"Casting Defects"

October 23
Southern California
Elks Club, Los Angeles

October 25
Chesapeake
Hamilton Hotel, Washington, D. C.
L. P. ROBINSON, Werner G. Smith Co.
"Baking Cores"

October 31
Toledo, Ohio
Hillcrest Hotel, Toledo, Ohio
H. W. DIETERT, Harry W. Dietert Co., Detroit, Mich.
"Practical Sand Control"

Ontario
Royal York Hotel, Toronto

October 17-18
Regional Conference
Purdue University, West Lafayette, Indiana

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CAST IRON

Specification No.	Specifications for
............*A 44-41	Cast-Iron Pit-Cast Pipe for Water and Other Liquids.
.... A 46-30T	Chilled-Tread Cast-Iron Wheels *(Tentative).*
.... A 48-41	Gray-Iron Castings.
.... A 74-39T	Cast Iron Soil Pipe and Fittings *(Tentative).*
.... A 126-40	Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
.... A 142-38	Cast-Iron Culvert Pipe.
.... A 159-41	Automotive Gray-Iron Castings.

STEEL

Specification No.	Specifications for
.... A 27-39	Carbon-Steel Castings for Miscellaneous Industrial Uses.
.... A 87-36	Carbon-Steel and Alloy-Steel Castings for Railroads.
............*A 95-41	Carbon-Steel Castings for Valves, Flanges, and Fittings for High-Temperature Service.
.... A 128-33	Austenitic Manganese-Steel Castings.
.... A 148-36	Alloy-Steel Castings for Structural Purposes.
............*A 157-41	Alloy-Steel Castings for Valves, Flanges, and Fittings for Service at Temperatures from 750 to 1100°F.
.... A 198-39	20 per cent Chromium, 9 per cent Nickel Alloy-Steel Castings.
............*A 215-41	Carbon-Steel Castings Suitable for Fusion Welding for Miscellaneous Industrial Uses.
............*A 216-41T	Carbon-Steel Castings Suitable for Fusion Welding for Service at Temperatures up to 850°F.
............*A 217-41T	Alloy-Steel Castings Suitable for Fusion Welding for Service at Temperatures from 750 to 1100°F.
.... A 221-39	Chromium Alloy-Steel Castings.
.... A 222-39	Chromium-Nickel Alloy-Steel Castings.
.... A 223-39	Nickel-Chromium Alloy-Steel Castings.

NON-FERROUS

Aluminum

Specification No.	Specifications for
............*B 26-41T	Aluminum-Base Alloy Sand Castings *(Tentative).*

NON-FERROUS (Continued)

Specification No.	Specifications for
............*B 58-41T	Aluminum-Base Alloys in Ingot Form for Sand Castings *(Tentative).*
............*B 108-41T	Aluminum-Base Alloy Permanent Mold Castings *(Tentative).*
............*B 112-41T	Aluminum-Base Alloys in Ingot Form for Permanent Mold Castings *(Tentative).*

Copper-Base

Specification No.	Specifications for
.... B 22-40T	Bronze Castings for Turntables and Movable Bridges and for Bearing and Expansion Plates of Fixed Bridges *(Tentative).*
............*B 30-41T	Copper-Base Alloys in Ingot Form for Sand Castings *(Tentative).*
............*B 60-41	Castings of the Alloy: Copper 88 per cent, Tin 8 per cent, Zinc 4 per cent.
............*B 61-41	Steam or Valve Bronze Castings Tentative Revision, see B 143-41T.
............*B 62-41	Composition Brass or Ounce Metal Castings—Tentative Revision, see B 145-41T.
.... B 66-38	Bronze Castings in the Rough for Locomotive Wearing Parts.
.... B 119-40T	Classification of Cast Copper-Base Alloys *(Tentative).*
............*B 132-41T	Leaded High-Strength Yellow Brass (Manganese Bronze) Sand Castings *(Tentative).*
............*B 144-41T	High-Leaded Tin Bronze Sand Castings *(Tentative).*
............*B 148-41T	Aluminum-Bronze Sand Castings *(Tentative).*

Magnesium

Specification No.	Specifications for
............*B 80-41T	Magnesium-Base Alloy Sand Castings *(Tentative).*
............*B 93-41T	Magnesium-Base Alloys in Ingot Form for Sand Castings and Die Castings *(Tentative).*

MALLEABLE

Specification No.	Specifications for
.... A 47-33	Malleable Iron Castings.
.... A 197-39	Cupola Malleable Iron.
.... A 220-39T	Pearlitic Malleable Iron Castings *(Tentative).*

GENERAL

Specification No.	Specifications for
.... A 119-33	Definition of Terms Relating to Heat Treatment Operations *(Especially as Related to Ferrous Alloys).*

*In process of printing. Orders for specifications so indicated will be filled as soon as they are off the press.

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